



ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

**MAGNITUDE OF PREECLAMPSIA AND ITS MATERNAL
AND PERINATAL OUTCOMES**

BY: DR. ABRHAM SHITAW (*INTERN*)

ADVISORS: MR. TEWODROS GETINET (MSC.)

**DR. MALEDE BIRARA (MD, MPH, ASSISTANT
PROFESSOR OF OBSTETRICS AND
GYNECOLOGY)**

**A STUDENT RESEARCH PROJECT SUBMITTED TO THE
DEPARTMENT OF PUBLIC HEALTH, ST. PAUL'S HOSPITAL
MILLENNIUM MEDICAL COLLEGE IN PARTIAL FULFILLMENT OF
THE REQUIREMENT FOR THE DEGREE IN DOCTOR OF MEDICINE.**

MAY, 2016

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Contents

List of Tables	i
List of Figures	ii
Acronyms and Abbreviations	iii
Acknowledgement	v
Abstract	vi
1. Introduction	1
1.1. Background of the study	1
1.2. Statement of the Problem	3
1.3. Significance of the Study	4
2. Literature review	5
2.1. Maternal and perinatal outcome	6
3. Research Objectives	8
3.1. General Objective	8
3.2. Specific Objectives	8
4. Methods and Materials	9
4.1. Study Area and Study Period	9
4.2. Study Design	9
4.3. Source population and study Population	9
4.4. Inclusion criteria	10
4.5. Exclusion criteria	10
4.6. Sample Size	10
4.7. Sampling Method	10
4.8. Data Collection	10
4.9. Data Analysis	11
4.10. Study Variables	11
4.10.1. Independent Variables	11
4.10.2. Dependent (outcome) Variables	11

4.11.Ethical Consideration	11
4.12. Operational definitions.....	12
4.13. Dissemination of findings	12
5. Results	
5.11. Sociodemographic characteristics	13
5.12. Mode of delivery	16
5.13. Maternal complications.....	18
5.14.Perinatal outcomes and complications.....	19
6. Discussion	24
7. Conclusion	26
8. Recommendations	27
9. Strengths and limitations of the study	28
9.11.Strengths of the Study	28
9.12.Limitations of the Study	28
10. References	29
11. Annexes	31

List of Tables

Table 1: Pre-delivery gravidity of mothers.	14
Table 2: Gestational age (time at diagnosis) characteristics of patients whose pregnancies were complicated by preeclampsia.....	15
Table 3: Gestational age at termination of patients whose pregnancies were complicated by preeclampsia.....	16
Table 4: Caesarian section indication of patients whose pregnancies were complicated by preeclampsia.....	17
Table 5: Table showing the frequencies of mothers who had more than one complications.....	19
Table 6: birth weight category of the neonates whose gestation is complicated by preeclampsia.....	20
Table 7: APGAR score category of the neonates born to preeclamptic mothers.....	20
Table 8: cross tabulation showing the associations between the sociodemographic variables, parity and ANC visit with the maternal and perinatal complications	23

List of Figures

Figure 1: Adverse conditions and complications of PE	3
Figure 2: Age distribution of mothers affected by preeclampsia from September 2007-March 2008 E.C, SPHMMC, Addis Ababa.....	13
Figure 3: Previous history of preeclampsia in mothers with PE at SPHMMC, Addis Ababa.....	14
Figure 4: A pie chart showing the ante natal care of mothers whose pregnancies were complicated by preeclampsia.....	15
Figure 5: Mode of termination of pregnancy of patients whose pregnancies were complicated by preeclampsia.....	16
Figure 6: A pie chart showing the presence of maternal complications.....	18
Figure 7: Frequencies of the maternal complications on mothers whose pregnancies were complicated by preeclampsia.....	18
Figure 8: final perinatal outcome of neonates born to mothers whose pregnancies were complicated by preeclampsia.....	21

Acronyms and Abbreviations

ANC	Ante Natal Care
ABD	Assisted Breech Delivery
APH	Antepartum Hemorrhage
AKI	Acute Kidney Injury
BP	Blood Pressure
CI	Confidence Interval
CS	Cesarean Section
DBP	Diastolic Blood Pressure
DIC	Disseminated Intravascular Coagulopathy
DM	Diabetes Mellitus
DTR	Deep Tendon Reflex
ELBW	Extremely Low Birth Weight
ENND	Early Neonatal Death
EDHS	Ethiopian Demographic And Health Survey
HMD	Hyaline Membrane Disease
HTN	Hypertension
Hx	History
ICH	Intra Cranial Hemorrhage
IUGR	Intra Uterine Growth Restriction
OBGYN	Obstetrics And Gynecology
HELLP	Haemolysis, Elevated Liver Enzyme, Low Platelets
IUFD	Intrauterine Fetal Death
LDH	Lactate Dehydrogenase
LMP	Last Menstrual Period
LBW	Low Birth Weight
MAS	Meconium Aspiration Syndrome
MDG	Millennium Development Goal
MgSO ₄	Magnesium Sulphate

NICU	Neonatal Intensive Care Unit
NRFHRP	Non Reassuring Fetal Heart Rate Pattern
NRBPP	Non Reassuring Biophysical Profile
PNA	Perinatal Asphyxia
PPH	Postpartum Hemorrhage
PT	Prothrombin Time
PTT	Partial Thromboplastin Time
RDS	Respiratory Distress Syndrome
SBP	Systolic Blood Pressure
SD	Standard Deviation
SPSS	Statistical Package For Social Sciences
SPHMMC	St. Paul's Hospital Millennium Medical College
SVD	Spontaneous Vertex Delivery
U/S	Ultra Sonography
WHO	World Health Organization

Acknowledgement

First, I would like to thank Almighty God. Next, I wish to express my heartfelt thanks to my advisors Dr. Malede Birara and Mr. Tewodros Getinet for their continued thoughtful guidance, unlimited support and constructive criticism throughout each step of this research. And also to SPHMMC hospital staff for their kind support and contribution in the data collection process.

Thank You!!

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Abstract

BACKGROUND: *Preeclampsia is a form of hypertension that is unique to human pregnancy. Preeclampsia refers to the new onset of hypertension and proteinuria after 20 weeks of gestation. It is a leading cause of maternal and perinatal morbidity and mortality worldwide. It affects 10% of pregnancies worldwide. Perinatal complications of severe preeclampsia include prematurity and its complication related to preterm labor or iatrogenic intervention, intrauterine growth restriction and perinatal death. Hence, this study is focused on determining the overall prevalence of preeclampsia and its maternal and perinatal outcomes.*

OBJECTIVES: *To study the overall prevalence of preeclampsia and assess the relation between the study variables and determine the maternal and perinatal outcomes of preeclampsia in SPHMMC, Addis Ababa.*

METHOD: *A hospital based descriptive cross-sectional study was conducted based on the medical records of the study population. Systematic random sampling method was used and data was collected to a prepared data collection template and then fed to SPSS version 20.0 for windows and frequencies numbers and percentages and cross-tab were done.*

RESULTS: *There were a total of 1042 cases of preeclampsia from all 13,500 deliveries attended in the hospital which makes the overall prevalence rate to be 7.71%. 25% (261) cases were selected for further investigation of the maternal and perinatal complications. The mean age of mothers who was preeclamptic is 27.5 years (SD=4.99). 59.8% of the mothers were found to be primigravid. The mean gestational age at diagnosis of PE was 32.7 weeks. Whereas the mean age of termination is 32.01 weeks. Cesarean delivery accounts for 52.9% of all the deliveries and operative vaginal deliveries account only for 2.3% of deliveries. Majority of the pregnancies were complicated by HELLP syndrome (44%) followed by eclampsia (30.2%). Other complications account for <10%. The mean gestational age of the neonates at delivery is 32 weeks and the mean birth weight is 2363±784 grams. Majority of the neonates were discharged along with their mothers while 10.6% of pregnancies end up in unsuccessful pregnancy outcomes. The study was done in St. Paul's Hospital Millennium Medical College, Addis Ababa, from December – May of 2008EC.*

Conclusion: *Prevalence of severe preeclampsia is progressively increasing among deliveries attended with increasing poor maternal and perinatal outcome; therefore it needs close monitoring and follow-up of high risk mothers in order to improve the quality of care given to our patients. Preeclampsia by itself and obstetric complications are major indications for cesarean deliveries among mothers who are having preeclampsia. Pregnancies complicated by hypertensive disorders of have poor maternal and perinatal outcomes and women from outside of Addis Ababa were more affected.*

Recommendation: *Quality antenatal care services with good obstetric and neonatal care at delivery are essential for early recognition and management of preeclampsia.*

Key words: *Retrospective Study, preeclampsia, Prevalence, ANC follow up.*

1. Introduction

1.1. Background

Preeclampsia is a common cause of maternal and perinatal morbidity and mortality in both developed and developing countries. Preeclampsia-eclampsia is one of the three most common causes of maternal mortality in the United States (thromboembolic disease and hemorrhage are the other two). There is approximately one maternal death due to preeclampsia-eclampsia per 100,000 live births, with a case-fatality rate of 6.4 deaths per 10,000 cases (1). In the Netherlands between 1993 and 2005, preeclampsia was the most common cause of maternal death, with 3.5 maternal deaths per 100,000 live births (2).

Preeclampsia is a form of hypertension that is unique to human pregnancy (4). Preeclampsia refers to the new onset of hypertension and proteinuria after 20 weeks of gestation in a previously normotensive woman. The disease is considered severe when any of the features like 1) symptoms of central nervous system dysfunction [blurred vision, scotomata, altered mental status, severe headache (ie, incapacitating, —the worst headache I've ever had) or headache that persists and progresses despite analgesic treatment], 2) symptoms of liver capsule distention [right upper quadrant or epigastric pain, nausea, vomiting], 3) hepatocellular injury [serum transaminase concentration at least twice normal], 4) severe blood pressure elevation [systolic blood pressure ≥ 160 mmHg or diastolic ≥ 110 mmHg on two occasions at least six hours apart], 5) thrombocytopenia [$< 100,000$ platelets per cubic millimeter], 6) oliguria < 500 ml in 24 hours, 7) pulmonary edema or cyanosis, 8) cerebrovascular accident are present (1).

Several risk factors have been identified with increased risk of preeclampsia. Generally, preeclampsia is considered a disease of primigravid women. The risk increases in those who have limited sperm exposure with the same partner before conception. The protective effects of long-term sperm exposure with the same partner might provide an explanation for the high risk of preeclampsia in women younger than 20 years old. A previous abortion (spontaneous and

induced) or a previous normal pregnancy with the same partner is associated with a lower risk of preeclampsia (4).

The pathogenesis of preeclampsia is incompletely understood, but the disorder is clearly initiated by the presence of trophoblast. Impaired remodeling of uterine spiral arteries, reduced placental perfusion, increased inflammation, increased production of anti-angiogenic factors, and maternal endothelial cell damage are hallmarks of the disorder.

Several preexisting maternal characteristics that increase the risk of preeclampsia, including hypertension, reduced renal function, obesity, insulin resistance, and diabetes. Maternal genetic or acquired thrombophilia's are also risk factors for early, severe preeclampsia, although this is controversial.

Major maternal risks of severe preeclampsia includes: eclampsia, abruption, progression to HELLP and its complication, disseminated intravascular coagulation, pulmonary edema, acute renal failure, hepatic rupture, post partum hemorrhage and anesthesia complication.

Perinatal complications of severe preeclampsia include prematurity and its complication related to preterm labour or iatrogenic intervention, intrauterine growth restriction and perinatal death.

Table 3. Adverse conditions and severe complications of preeclampsia

Organ system affected	Adverse conditions (that increase the risk of severe complications)	Severe complications (that warrant delivery)
Central nervous system	Headache/visual symptoms	Eclampsia PRES Cortical blindness or retinal detachment Glasgow coma scale < 13 Stroke, TIA, or RIND
Cardiorespiratory	Chest pain/dyspnea Oxygen saturation < 97%	Uncontrolled severe hypertension (over a period of 12 h despite use of three antihypertensive agents) Oxygen saturation < 90%, need for ≥ 50% oxygen for > 1 h, intubation (other than for Caesarean section), pulmonary edema Positive inotropic support Myocardial ischemia or infarction
Haematological	Elevated WBC count Elevated INR or aPTT Low platelet count	Platelet count < 50 × 10 ⁹ /L Transfusion of any blood product
Renal	Elevated serum creatinine Elevated serum uric acid	Acute kidney injury (creatinine > 150 µM with no prior renal disease) New indication for dialysis
Hepatic	Nausea or vomiting RUQ or epigastric pain Elevated serum AST, ALT, LDH, or bilirubin Low plasma albumin	Hepatic dysfunction (INR > 2 in absence of DIC or warfarin) Hepatic haematoma or rupture
Feto-placental	Abnormal FHR IUGR Oligohydramnios Absent or reversed end-diastolic flow by Doppler velocimetry	Abruption with evidence of maternal or fetal compromise Reverse ductus venosus A wave Stillbirth

PRES: posterior reversible leukoencephalopathy syndrome; TIA: transient ischemic attack; RIND: reversible ischemic neurological deficit (< 48 hr); WBC: white blood cell; INR: international normalized ratio; aPTT: activated partial thromboplastin time; RUQ: right upper quadrant; AST: aspartate aminotransferase; ALT: alanine aminotransferase; LDH: lactate dehydrogenase; DIC: disseminated intravascular coagulation; FHR: fetal heart rate.

Fig1: Adverse conditions and complications of PE

The management of severe pre-eclampsia is based on careful assessment, stabilization, continued monitoring and delivery at the optimal time for the mother and the baby. This means controlling blood pressure and if necessary convulsions.

1.2 Statement of the Problem

Preeclampsia is a leading cause of maternal and perinatal morbidity and mortality, worldwide. The adverse complications associated with preeclampsia like eclampsia, HELLP syndrome, APH, PPH, preterm labor, DIC, renal failure, RDS, IUGR, ICH and others are the major causes of fetomaternal morbidity and leading to maternal perinatal mortality. Despite the advancement of medical practice, preeclampsia and eclampsia are still leading causes of maternal, perinatal and early neonatal morbidity and mortality. Overall the perinatal mortality is increased five folds in mothers with preeclampsia than the general population.

1.3 Significance of the study

This study will be important to assess the prevalence of preeclampsia and its maternal and perinatal outcomes among all deliveries held at SPHMMC in the 18 months of study time. It will be helpful for both the department of obstetrics and gynecology and department of public health for generation of further research topics.

It also helps to understand how socio demographic variables like age, parity, previous history of PE, family history of PE, ANC follow up, and others are related with the overall prevalence of preeclampsia and will also have significant advantage for other researchers who are interested in assessing the maternal and perinatal outcomes associated with preeclampsia. It will also be important to check the correlation or similarity of the results that were reported in previous researches.

2. Literature Review

Preeclampsia is a leading cause of maternal and perinatal morbidity and mortality worldwide. It affects 10% of pregnancies worldwide (10). Extrapolated incidence of preeclampsia in USA is 157,969; 32,422 in UK; 4,008 in Switzerland; 698,703 in China; 572,945 in India; 40,946 in Egypt; 17,742 in Kenya and 38,373 in Ethiopia (14).

A database of hospital discharge data from approximately 300,000 deliveries in the United States found the overall incidence of severe preeclampsia was about 1 percent of all pregnancies. Studies limited to nulliparous women report that about 5 percent develop preeclampsia and 40 to 50 percent of these women develop severe disease. The incidence of severe preeclampsia at <34 weeks is 0.3 percent (11).

Pre-eclampsia is common with a prevalence estimated at 2.3% of all pregnancies in developing countries (8). A study done at Okolobiri, Nigeria suggests that, the incidence ratio of PE-EC was 5.69%, 4 patients died due to complications of PE-EC, perinatal mortality was 34%. Only 26.6% attended antenatal clinic at least once during the pregnancy, 69.5% were managed by the TBA and 51.9% had abdominal massage prior to presentation. Anemia was present in 48.4%, only 20 had post-secondary education, 85% resides in rural areas, while 62.11% were unemployed and cesarean section rate was 48.4% (13).

A study done by Yücesoy G, Ozkan S, et.al, Maternal and perinatal outcome in pregnancies complicated with hypertensive disorder of pregnancy: a seven year experience of a tertiary care center 438 cases (8.49%) were managed as hypertensive disorder of pregnancy. Of these 54.11% were found to have severe preeclampsia while 34.50% were diagnosed as mild preeclampsia. Of 138 severely preeclamptic cases, 11% had eclamptic convulsion and another 11% were demonstrated to have HELLP syndrome. Intrauterine growth restriction, oligohydramnios, placental ablation were the obstetric complications in 29.4%, 19.2%, 7.5% cases, respectively. Additionally multiple pregnancy and gestational diabetes mellitus were noted in 5.9% and 3.9% of the patients. Delivery route was vaginal in 41.2% while 58.8% underwent cesarean section with the most frequent indication to be fetal distress in 46% of the cases. Cesarean section rate seemed to be the lowest (48.3%) in chronic hypertensive women while the highest (63.8%) in severe preeclamptic patients. Maternal mortality occurred in 3 cases (1.2%) and all of those cases were

complicated with HELLP syndrome. Intrauterine fetal demise was recorded in 24 cases on admission. Ten fetuses died during the intrapartum period. Mean gestational age and birth weight were 28 +/- 3.5 and 1000 +/- 416 g, respectively in this group. In these ten women, five cases were diagnosed as HELLP syndrome, two were severely preeclamptic and three were eclamptic. Perinatal mortality rate was found to be 144/1,000 births (15).

According to a study done at Jimma University specialized hospital, the overall prevalence of hypertensive disorders of pregnancy was 8.5%. Severe preeclampsia accounted for 51.9% of the cases followed by eclampsia (23.4%). Majority (52.5%) of the mothers were in the age group of 25 - 34 years. Residential area of the mothers (urban/rural) was found to have statistically significant association with severity of the disorder. Most (66.5% and 74.7%) of the mothers were nulliparous and had antenatal care follow-up during the index pregnancy, respectively. Antenatal care follow-up and parity had no statistically significant association with severity of the disease. The case fatality rate of hypertensive disorders of pregnancy was 1.3% with perinatal mortality of 317.1/1000 births (12).

2.1 Maternal and perinatal outcome

The major adverse outcomes associated with preeclampsia are related to maternal central nervous system, hepatic, and renal dysfunction (eg, cerebral hemorrhage, hepatic rupture, renal failure), bleeding related to thrombocytopenia, preterm delivery, fetal growth restriction, abruptio placentae, and perinatal death. Factors that influence outcome include gestational age at onset and delivery, severity of disease, and whether there are coexisting conditions present, such as multiple gestation, diabetes mellitus, renal disease, thrombophilia, or preexisting hypertension (18).

A literature review including 72 publications reported the following serious maternal complications of severe preeclampsia: seizures, pulmonary edema, hypertensive encephalopathy, stroke, renal failure, hepatic failure or rupture, retinal detachment or cortical blindness, disseminated intravascular coagulation, placental abruption, and death (17). The magnitude of increased morbidity associated with preeclamptic pregnancies was best illustrated in a controlled

study that compared the pregnancy outcome of 319 women with mild or severe preeclampsia delivering their first baby to that of 3229 similar women whose blood pressure remained normal during the pregnancy (18). The major consequences of severe preeclampsia were increased rates of maternal liver and kidney dysfunction, induced labor, cesarean delivery, preterm birth, fetal growth restriction, and neonatal respiratory problems. The highest risk of maternal and neonatal morbidity was in pregnancies complicated by severe second trimester preeclampsia. In this series, there was no significant increase in the rate of fetal or neonatal death, but others have found that earlier onset of severe preeclampsia and severely restricted fetal growth are associated with a dismal neonatal prognosis (20).

3. Research Objectives

3.1 General objective

- ✓ To determine the overall prevalence of preeclampsia among all deliveries held on the period of 18 months in SPHMMC and assess the maternal and perinatal outcomes of preeclampsia cases.

3.2 Specific Objectives

- ✓ Determine the overall prevalence of preeclampsia among all deliveries
- ✓ Identify the maternal and perinatal outcomes and complications in mothers with preeclampsia
- ✓ To analyze the distribution of preeclampsia among socio-demographic characters, previous history, family history and ANC follow up.

4. Method and Materials

4.1 Study area and Study Period

St. Paul's Hospital is the third largest public hospital in Ethiopia, located in Addis Ababa, Gullele sub-city. Built by Emperor Haile Selassie in 1961, it primarily serves those unable to afford care elsewhere, providing service free of charge to 75% of its patients. An estimated 800 clinical and non-clinical staff provide care to approximately 110,000 people each year. St. Paul's receives referrals from around the country and is under the guidance of the Ethiopian Federal Ministry of Health (FMOH). The hospital has around 45 obstetric beds divided in two wards giving optimal care for high-risk mothers and post-natal patients. In 2007, St. Paul's added a medical college, St. Paul's Hospital Millennium Medical College (SPHMMC). At least 30% of these students are recruited from rural areas of Ethiopia, and at least 30% of students are women. SPHMMC is unique in that its students must take a qualifying exam specific to SPHMMC. The study was conducted at SPHMMC from December - May of 2008 EC.

4.2 Study design

A hospital based cross-sectional descriptive study was conducted based on record review of maternal charts documented from September 2007- March 2008 EC.

4.3 Source population and study population

The total number of mothers whose pregnancies were complicated by preeclampsia and who delivered at the labor ward of the hospital and with complete data were considered as a source population of the study and 25% of these mothers were selected as a study population for further investigation and analysis.

4.4. Inclusion Criteria

All mothers whose pregnancies were complicated by preeclampsia and delivered at the labor ward.

4.5 Exclusion criteria

Mothers with incomplete medical records.

4.6. Sample size

There were a total of 1042 cases of preeclampsia over the period of 18 months from these cases 25% of the cases were selected for further investigation and analysis due to time and finance for analysis. 25% were selected because a primary pilot survey was done from all the charts of the hospital and resulted in a prevalence rate of 22.2%. Approximating this to a nearby figure, we took 25% for calculating sample size.

$$\text{i.e. } 0.25 \times 1042 = 260.5 \approx 261$$

These 261 cases were selected for further investigation on maternal and perinatal complications and outcomes.

4.7 Sampling Method

Systematic random sampling method was used to select the cases from the source population.

4.8. Data Collection

Data was collected from the registry book and data was collected from individual medical records were registered to a template that was formulated to register data. Data was collected by the principal researcher and trained persons for collecting data by the investigator.

4.9. Data Analysis

The collected data were inserted to a computer and subjected to statistical analysis using Statistical Package for Social Sciences (SPSS). Frequency distribution, number, percentage cross-tab were done. Microsoft Excel and word 2013 were used to make graphs and charts.

4.10 Study variables

4.10.1 Independent variables

- Age
- Parity
- Marital status
- Educational status
- ANC followup
- Gestational age
 - At diagnosis of preeclampsia
- Previous history of preeclampsia/eclampsia
- Family history of preeclampsia/HTN

4.10.2 Outcome (dependent variables)

The principal dependent variable of the study is the maternal and perinatal outcomes and complications.

4.11 Ethical consideration

The research was started after an approval letter was received from the department of public health and the department of obstetrics and gynecology. All efforts were done to maintain the confidentiality of the data. Names or any personal identifiers were not recorded and transferred to other parties other than the investigator.

4.12 Operational Definition

Teenage pregnancy- a pregnancy which occurs when the maternal age is ≤ 19 .

Grand Multipara- a woman who has ≥ 5 deliveries.

Preeclampsia- new onset of hypertension SBP 140/90 and proteinuria of $>0.3\text{gm}$ in 24 hr urine specimen after 20 weeks of gestation

Eclampsia- presence of new onset of grandma seizure in a woman with preeclampsia.

HELLP- (hemolysis, elevated liver enzymes, and low platelets) was defined as thrombocytes $<100 \times 10^3$, and both aspartate aminotransferase (ASAT) and alanine aminotransferase (ALAT) >70 U/l and lactate dehydrogenase >600 .

Abruptio placenta: is a premature separation of the whole or part of a placenta implanted in the upper segment of the uterus.

Post-partum hemorrhage: is *excessive* genital bleeding within 24 hours of delivery of a 28 or more-weeks baby.

Low birth weight- birth weight ranging between 1500-2499 grams.

Preterm delivery- A delivery of an alive infant between gestational ages of ≥ 28 weeks- 37 weeks.

Abortion- the expulsion of the products of conception before the 28th week of pregnancy

Still birth- birth of a fetus above the age of viability or 28 weeks.

4.13 Dissemination of findings

This research report will be submitted to the Department of Public Health, St Paul's Hospital Millennium Medical College in partial fulfillment of the requirement for the Degree in Doctor of Medicine and also to SPHMMC department of obstetrics and gynecology. Findings will be published online and will be presented in associated conferences and journals.

5. Result

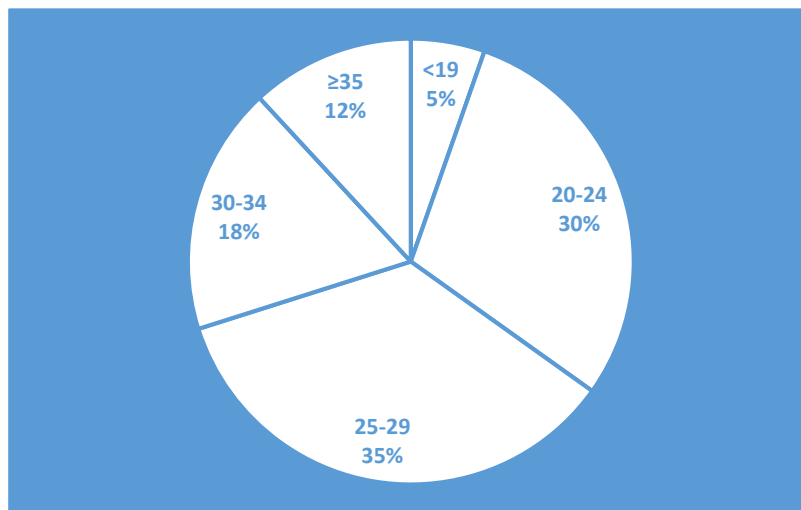
There were a total of 13500 deliveries in the labor ward of the hospital in the study time from September, 2007 – March, 2008. From which 1042 were complicated by preeclampsia and other associated hypertensive disorders of pregnancy. This makes the overall prevalence of preeclampsia to be 7.71% taking all the pregnancies complicated by preeclampsia.

From the 1042 cases 261(25%) were selected based on systematic random sampling and subjected for further investigation and analysis.

5.1 Socio- demographic characteristics

From the 261 cases of preeclampsia selected for study, majority of the mothers are aged between 25-29 which account for 35.2% (92) with the mean age being 27.5 ± 5 years. Whereas the age group between 20-24 has the second most common age group affected by preeclampsia which is 29.5%(77). There is a total of 14 teenage pregnancies which accounts for 5.4%. Mothers whose age are older than 35 account for 11.9% (31) of all pregnancies complicated by preeclampsia.

Fig. 2- Age distribution of mothers affected by preeclampsia from September 2007-March 2008 E.C, SPHMMC, Addis Ababa, Ethiopia.



Most of the women were residing in Addis Ababa whom accounted for 133 (51%) of all cases selected for study. The rest 49 % were from Out of Addis Ababa. 99.2% of the study subjects are married while only 0.8% of them account for single mothers.

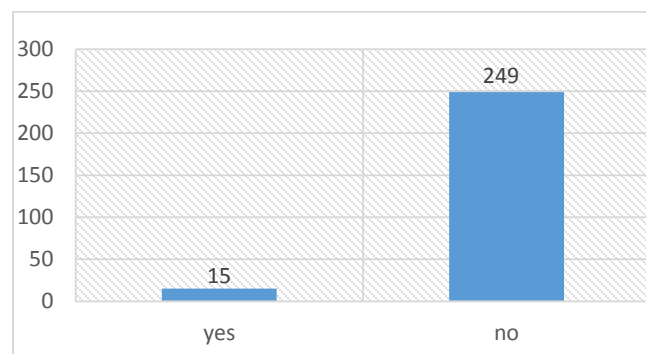
As presented on table 1 156(59.8%) of the mothers are primigravid while multigravidas account for 39.5% of all cases. There were only 2 mothers who were found to be grand multiparous.

Table 1- Pre-delivery gravidity of mothers with PE in SPHMMC, from September 2007-March 2008.

Gravidity	Frequency	Percent
Primigravid	156	59.8
Multigravida	103	39.5
Grand multipara	2	0.8

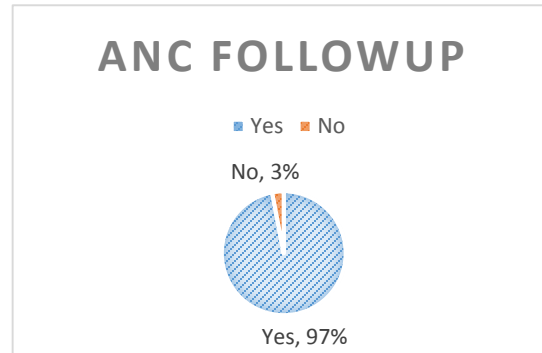
All of the mothers selected for this study have no familial history of preeclampsia or familial history of hypertension. And only 15 mothers (5.7%) had previous history of preeclampsia whereas majority of them had no previous history. Fig 3.

Fig 3- Previous history of preeclampsia in mothers with PE at SPHMMC, Addis Ababa.



While determining the ante natal care coverage of the mothers, majority 253 (96.9%) of them were having ante natal care at a nearby health care facility where as mothers who doesn't have ANC follow up account for only 8 (3.1%).

Fig 4- A pie chart showing the ante natal care of mothers whose pregnancies were complicated by preeclampsia



As shown in table 4, the mean gestational age at diagnosis was 32.69 ± 4.5 . Women who were diagnosed with preeclampsia/ eclampsia before 28 weeks accounted for 11 (42.1%) cases. While the majority of them reside in the gestational age category ≥ 37 weeks of gestation. The gestational age category between 34- 37 weeks of gestation account for 84 cases which is the second common time at diagnosis. 3 mothers were found to be preeclamptic after delivery.

Table 2- Gestational age (time at diagnosis) characteristics of patients whose pregnancies were complicated by preeclampsia from September 2007- March 2008 at SPHMMC, Addis Ababa.

Time at diagnosis	Frequencies
<26	8
26-27 ⁺⁶	3
28-33 ⁺⁶	42
34-36 ⁺⁶	84
≥ 37	102
Post delivery	3
Unreliable/unknown	19

The mean gestational age for termination of pregnancies was 32.01 weeks by which 102(39.08%) were terminated above the gestational age of 37weeks. 121 pregnancies were terminated between the gestational ages of 28 weeks and 36⁺⁶ weeks which accounted for 46.36% of pregnancies. 9 pregnancies were terminated before the age of fetal viability which is 28 weeks. 29 pregnancies were terminated at unknown gestational ages.

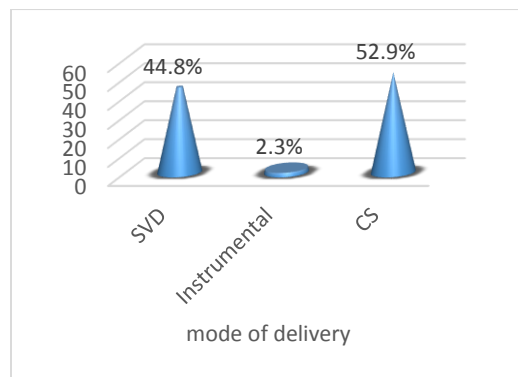
Table 3- Gestational age at termination of patients whose pregnancies were complicated by preeclampsia in SPHMMC, Addis Ababa.

Gestational age at termination	Frequencies
<28	9
28-33 ⁺⁶	33
34-36 ⁺⁶	88
≥37	102
Unknown	29

5.2 Mode of delivery

From the 261 mothers 138 (52.9%) mothers delivered by cesarean section whereas 44.8% of the mothers delivered through vaginal delivery. Only 6 mothers whom accounted for 2.3% delivered by instrument assisted delivery.

Fig 5- Mode of termination of pregnancy of patients whose pregnancies were complicated by preeclampsia



As stated in table 4, the common indication for cesarean section are NRFHRP accounted for 22.3%, failed induction which accounts for 8.63%, oligohydramnios accounting for 9.35%, previous CS+ severe preeclampsia f, twin + severe preeclampsia, LFSOL + GII MSAF.

Table 4-Caesarian section indication of patients whose pregnancies were complicated by preeclampsia

<i>Indication for cesarean section</i>	<i>Frequency (%)</i>
<i>NRFHRP</i>	31(22.46)
<i>Failed induction</i>	12(8.69)
<i>Oligohydramnios</i>	13(9.42)
<i>Previous CS+ SPE</i>	18(13.0)
<i>Twin+ SPE</i>	13(9.42)
<i>LFSOL+ GII MSAF</i>	15(10.8)
<i>Others **</i>	36(26.0)

** Indications were too many to list each accounting less than 5.

5.3 Maternal outcomes and complications

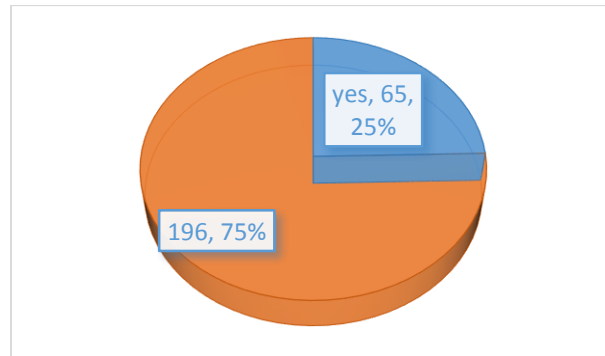


Fig 6- A pie chart showing the presence of maternal complications

As plotted in the above pie chart, about 75.1% of mothers delivered without any complications associated with PE while 24.9% of the mothers have acquired complications.

The different complications and their respective frequencies are listed in the following figure. The majority of pregnancies were complicated by HELLP syndrome whereas eclampsia accounted for the second most common complication of pregnancies complicated by preeclampsia. 2 mothers developed stroke as a complication of preeclampsia which is grouped in others and there was no pregnancy complicated by maternal death.

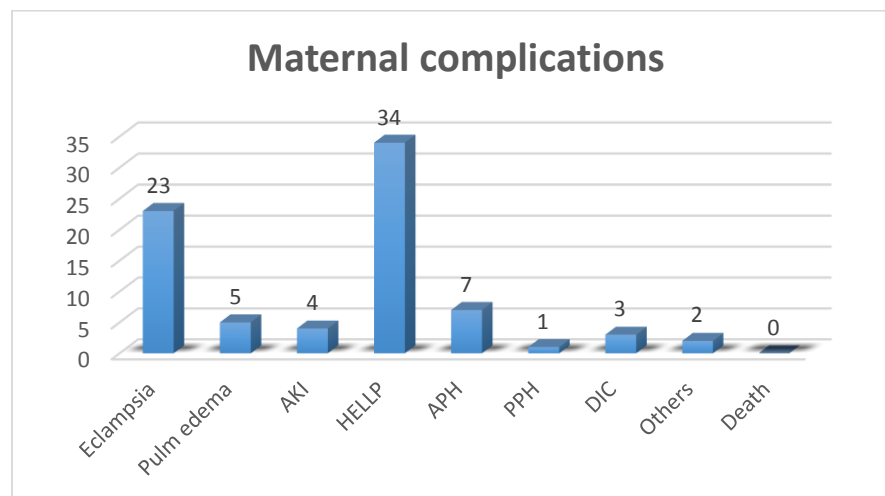


Fig 7- Frequencies of the maternal complications on mothers whose pregnancies were complicated by preeclampsia.

Most of the mothers had a single complication from the listed ones. But there are also mothers who had more than one complication at the same time.

Complications	Frequencies
<i>HELLP+APH</i>	4
<i>Pulm edema+ APH+ DIC</i>	1
<i>AKI+ HELLP</i>	3
<i>Eclampsia+ HELLP</i>	2
<i>HELLP+ PPH</i>	1

Table 5- Table showing the frequencies of mothers who had more than one complications.

5.4 Perinatal outcomes and complications

From the 261 deliveries 100 of them had perinatal complications which include still born, early neonatal deaths and referral to the NICU. Whereas 161 neonates were discharged along with the mothers.

Gestational age

The mean gestational age for termination of pregnancies which in fact is the mean gestational age for the neonates becomes 32.01 weeks. 39.39% of the neonates had a gestational age of above 37 weeks whereas 46.36% (121) neonates had gestational ages between 28 and 34 weeks. 9 pregnancies were terminated before the age of viability and about 29 neonates have unknown gestational ages. (Table 6)

Birth weight

As shown in table 6, the majority (133) of the neonates delivered from mothers whose pregnancies were complicated by preeclampsia reside in the weight category between 2500-3999grams. While

the weight category between 1500-2499 acquire the second common birth weight for about 95 neonates. 14 neonates were categorized in the weight category between 1000- 1499 and the weight category <1000 grams constitute for 15 deliveries. Only 1 neonate had a birth weight of ≥ 4000 grams. 3 neonates had unknown birth weight since the mothers are referred after delivery. The mean birth weight is calculated to be 2363 ± 784 grams.

Category of wt. in grams	Frequency	
<1000	15	
1000-1499	14	
1500-2499	95	
2500-3999	133	
≥ 4000	1	
Unknown	3	
Mean wt.		2363 $\pm$ 784 grams

Table 6- birth weight category of the neonates whose gestation is complicated by preeclampsia.

APGAR score

About 221 (84.6%) of the neonates born to preeclamptic mothers have a 5th minute APGAR score of ≥ 7 . While 20 neonates had APGAR scores between 4 and 6. 17 neonates had a 5th minute APGAR score of 0. The APGAR score of 3 neonates was unknown since their mothers are referred after delivery.

APGAR score	Frequency	
0	17	
1-3	0	
4-6	20	
≥ 7	221	
UK	3	
Mean APGAR		7.66 $\pm$ 2.4

Table 7- APGAR score category of the neonates born to preeclamptic mothers.

Neonatal outcomes

The final perinatal outcomes of the neonates born to mothers whose pregnancies were complicated by preeclampsia is depicted in the following figure. 230 of the neonates were born alive from which 69 were transferred to the NICU for better evaluation and management whereas the rest were discharged with the mother. 17 were intra uterine fetal deaths from which 9 were still births and 8 were technically abortions. And 11 pregnancies were complicated by early neonatal deaths. The final outcome of three neonates was unknown because the mothers are referred to the hospital after delivery.

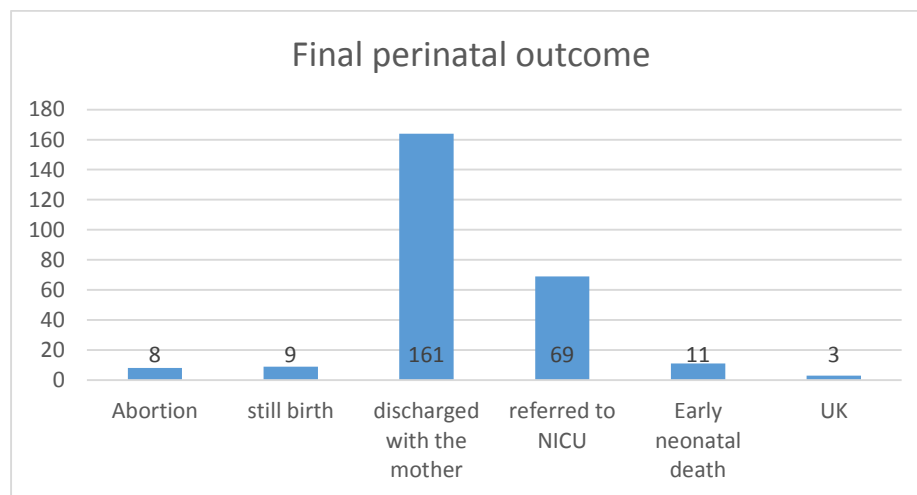


Fig 8- final perinatal outcome of neonates born to mothers whose pregnancies were complicated by preeclampsia.

Factors associated with maternal complication

65 among 264 mothers in different age groups develop maternal complications making 24.9%. When distributed to the different age groups, the average percentage is 27.48 which has no significant variation from the overall incidence of complication. This might suggest that the age of the mother doesn't have significant relation with maternal complications. The marital status of mothers whose pregnancies were complicated by preeclampsia may not have a significant association with the presence or absence of any of the maternal complications since 99.2% of mothers with complications are married But there is a significant association between the place of residence and the maternal complication since 39 out of 65 mothers who had complications are

from outside of Addis Ababa.

Only 3 mothers who had previous history of preeclampsia develop complications whereas the other 80% didn't have any complication. This might mean that there is no significant relation between having previous history and having complications.

75% of the mothers who had maternal complications are mothers who didn't have any ANC follow up whereas only 23.3% of mothers who had regular ANC follow up develop complications associated with preeclampsia. So having ANC follow up may have a significant relation with the development of maternal complications.

Variables	Maternal complication				Perinatal Complication			
	Yes		No		Yes		No	
	n	%	n	%	n	%	n	%
Age								
<19	3	21.4	11	78.6	2	14.3	12	85.7
20-24	16	20.3	61	79.2	32	41.6	45	58.4
25-29	23	24.7	69	75.0	32	34.4	60	65.2
30-34	12	25.5	35	74.5	19	40.4	28	59.6
≥35	11	35.5	20	64.5	15	48.4	16	51.6
Residence								
Addis Ababa	26	19.5	107	80.5	50	37.6	83	62.4
Out of Addis Ababa	39	30.5	89	69.5	50	39.1	78	60.9
Marital status								
Married	63	24.3	196	75.7	98	37.8	161	62.2
Single	2	100	0	0.00	2	100	0	0.00

Pre- delivery gravidity (Parity)								
Primigravid	42	26.9	114	73.1	62	39.7	94	60.3
Multigravida	22	21.4	81	78.6	37	35.9	66	64.1
Grand Multi para	1	50.0	1	50.0	1	50.0	1	50.0
Ante-natal care follow up								
Yes	59	23.3	194	76.7	96	37.9	157	62.1
No	6	75	2	25	4	50.0	4	50.0
Previous history								
Yes	3	20	12	80	8	53.3	7	46.7
No	62	25.2	184	74.8	92	37.4	154	62.6

Table 8- table showing the frequencies of the sociodemographic variables, parity and ANC visit with the maternal and perinatal complications.

6. Discussion

Preeclampsia is a multisystem hypertensive disorder of pregnancy with new onset after 20 weeks of gestation which is a leading cause of worldwide maternal and fetal morbidity- mortality.

Prevalence of preeclampsia accounted 7.7% of all the deliveries attended in St. Paul's Hospital Millennium Medical College labor ward in the 18 months of study time. This correlates with a study done in Addis Ababa on prevalence of preeclampsia and effect of termination in maternal and perinatal outcomes (1). This also correlates with a study done in Jimma University specialized hospital which stated that the overall prevalence rate of preeclampsia to be 8.5% (12). But the result of this study does not correlate with a report stating that the prevalence rate of preeclampsia in developing country is 2.3% (8). A study done in Nigeria which stated that the prevalence rate of preeclampsia to be 5.69% has slight correlation with our study (13).

Majority of the mothers whose pregnancies were complicated by preeclampsia were in the age group 25-29 accounting for 35.2%. 29.5% were in the age group 20-24 years of age. These correlates to a study by Yücesoy G, et al which mentioned that preeclampsia is common before the age of 30. But larger scale trials should be done to assess the age distribution of preeclampsia. 135 (51.1%) were from Addis Ababa whereas the rest 48.9 were from outside of Addis Ababa.

156 (59.8%) of the mothers were primigravid while 39.5% (103) mothers were multigravida. Only 2 mothers were found to be grand multiparous. This result will correlate with a study done by Mariamawit Asfaw in prevalence of severe preeclampsia and effect of termination in maternal and perinatal outcomes, which states that majority (44.2%) of the mothers were primigravid.

Only 8(3%) of women had no ante natal care follow up prior to presentation. This may be as a result of increased knowledge on ante natal care follow up in the general society.

The mean gestational age at initial diagnosis in this study is 32.74 ± 4.5 weeks which has a correlation with a study done in Addis Ababa stating that the median age at diagnosis is 35.5 weeks (1). Whereas the mean gestational age at termination of pregnancy is found to be 32.07 weeks.

Regarding mode of delivery, 138 (52.9%) of the cases underwent cesarean section. This rate is almost similar to a study done in Addis Ababa in prevalence of preeclampsia in three hospitals stating the CS rate to be 48.8% and a Nigerian study suggesting the CS rate is 48.4% (1)(13). This

also correlates with a study done at Jimma university specialized hospital which claims the CS rate to be 80.6% and an Iranian study which claims the overall cesarean section rate in patients with preeclampsia to be 45.8%.

The highest maternal complication in this study is acquired by HELLP syndrome which acquires 34 out of 76 complications which is 44%. It is followed by eclampsia which accounts for 23 (30.2%) of all the complications. APH, pulmonary edema, AKI, stroke and PPH account for 9.2%, 6.5%, 5.26%, 2.6%, 1.3% respectively. There was no maternal death documented and attributed to complication of preeclampsia. This correlates to a Holland study which claims that HELLP syndrome accounts for the greater majority of maternal complications associated with preeclampsia followed by eclampsia and pulmonary edema. There was a single maternal mortality in this study which was attributed as a complication of preeclampsia (6).

The mean gestational age of the neonates at delivery in our study is found to be 32 weeks where 121 (46.36%) were in the gestational age group between 28-34 weeks which is in the prematurity range. This correlates to most studies that concluded preeclampsia is mainly associated with prematurity and low birth weight. 9 pregnancies were terminated before the age of viability. One Indian study resulted in prematurity percentage of 74.51%.

The perinatal outcome of the neonates born to mothers whose pregnancies were complicated by preeclampsia is complicated with 9 still births, 8 abortions and 11 early neonatal deaths and 69 referrals to the NICU. This correlates with a Holland study which resulted in 19 still births and 4 neonatal deaths (6).

Pregnant mothers from outside of Addis Ababa have higher percentage of complications compared to mothers who are living in Addis Ababa.

7. Conclusion

Prevalence of severe preeclampsia is progressively increasing among deliveries with increasing poor maternal and perinatal outcome; therefore it needs close monitoring and follow-up of high risk mothers in order to improve the quality of care given to our patients. Most of the adverse maternal and perinatal outcomes were observed in those patients who develop severe preeclampsia at earlier gestational age and in those complicated with HELLP syndrome and eclampsia.

Preeclampsia by itself and obstetric complications are major indications for cesarean deliveries among mothers who are having preeclampsia.

The ANC follow up of mothers is promising and helpful in early detection and prevention of complications associated with preeclampsia.

8. Recommendation

For the department of Obstetrics and Gynecology

- ✓ Providing special check lists for registering data in mothers who present with symptoms and signs of preeclampsia so that follow up will be easy and data will be easy to access.
- ✓ Chart keeping is optimal but further modification in neonatal variables should be done especially when the neonates are referred to the NICU.

For Fellow researchers

- ✓ Further research in assessing the neonatal outcomes of neonates transferred to the NICU who were born to mothers with preeclampsia will be so much helpful in determining the overall perinatal outcomes.
- ✓ Studying preeclampsia on prospective basis is helpful in determining the prevalence of preeclampsia on seasonal and geographical location basis.

9. Strengths and Limitations of the Study

9.1 Strengths

- ✓ Systematic random sampling method was used and it is a good representative of the study population
- ✓ Tried to assess the factors associated with maternal and perinatal complications and the commonest complications of preeclampsia are addressed.

9.2 Limitations

The main limitations of this study include its

- ✓ Time constraints
- ✓ Financial constraints
- ✓ Cross sectional study is poor to show cause and outcome relationships
- ✓ Didn't explore the management of each cases
- ✓ Couldn't find data related to the neonates referred to NICU

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11. Annex

ANNEX I- Data Collection Format

										Maternal Complications										Neonatal Variables				Outcomes			
Ser. No.	Card No.	Age	Residence	Marital Status	Parity	Prev Hx	Family Hx	ANC	Time At Dx	No	Eclampsia	Pulm Edema	ARF	HELLP	APH	PPH	DIC	Death	Others	GA	BW	APGAR	MOD	Still Birth	Alive		Neonatal Death
																									D/C	NICU	
1																											
2																											
3																											
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