PREVALENCE AND DETERMINANTS OF MATERNAL AND PERINATAL OUTCOME OF PREECLAMPSIA AT A TERTIARY HOSPITAL IN ETHIOPIA

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ABSTRACT

INTRODUCTION: Preeclampsia is a common pregnancy disorder with potential adverse maternal and neonatal outcome. This study aimed to assess the prevalence and determinants of maternal and perinatal outcome of preeclampsia at Ayder Comprehensive Specialized Hospital. Ayder Comprehensive Specialized Hospital (ACSH), is a tertiary hospital in northern Ethiopia where most preeclamptic patients are treated.

METHODS: We performed a retrospective chart review of preeclamptic patients treated at ACSH between September 1, 2015 and August 31, 2018. Descriptive analysis and logistic regression were applied for different variables. P value <.05 was taken as statistically significant.

RESULTS: Over the study period, the total number of deliveries recorded was 8,502. There were 362 patients with preeclampsia. Poor maternal outcome was present in 40% of cases while 25% of cases had poor perinatal outcome. The top three poor maternal outcomes reported in this study were maternal death (2.8%), eclampsia (6.6%), and renal failure (1.1%). Headache (AOR 32.26 95% CI 0.03-32.60 and low hemoglobin value (AOR 15.94 95% CI 2.34-108.81) were associated with poor maternal outcome. The poor perinatal outcomes were still births (5.8%), early neonatal deaths (1.1%), and low APGAR score (18.8%). Earlier gestational age at diagnosis (AOR 2.15 95% CI 1.22-3.79) was associated with poor perinatal outcome.

CONCLUSIONS AND RECOMMENDATIONS: In a resource limited setting where diagnostic tools are scarce, clinical profile should be taken into consideration for prediction of poor outcome. Owing to the association found in between maternal outcome and hemoglobin, further prospective research is required to identify if anemia was the cause or effect of preeclampsia.

KEYWORDS: Preeclampsia, maternal, perinatal, outcome, Ayder, Ethiopia

(The Ethiopian Journal of Reproductive Health; 2-19; 11;4: 1-8)

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INTRODUCTION

Hypertension is the most frequent medical complication of pregnancy, occurring in 10% of pregnancies and being the main cause of perinatal mortality and morbidity1. Hypertensive disorders during pregnancy are classified into 4 categories, as recommended by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy: Chronic hypertension, preeclampsia-eclampsia, preeclampsia superimposed on chronic hypertension, and gestational hypertension[2,3].

Preeclampsia is a common pregnancy specific disease with potential adverse maternal and neonatal outcome that affects 3–5% of all pregnancies1. The criteria that define pre-eclampsia have not changed over the past decade3. These are: onset at >20 weeks' gestational age of 24-hour proteinuria ≥30 mg/day or, if not available, a protein concentration ≥30 mg (≥1+ on dipstick) in a minimum of two random urine samples collected at least 4–6 hours but no more than 7 days apart, a systolic blood pressure >140 mmHg or diastolic blood pressure ≥90 mmHg as measured twice, using an appropriate cuff, 4–6 hours and less than 7 days apart, and disappearance of all these abnormalities before the end of the 12th week postpartum. Nonetheless, some presentations of pregnancy-related hypertension combined with clinical or laboratory abnormalities should also be considered as potential preeclampsia[2].

In developed countries preeclampsia represents one of the most frequent causes of maternal death (15% of all maternal deaths) and near-miss including eclampsia, placental abruption, pulmonary edema, and acute renal failure[4].

Preeclampsia is a major cause of perinatal mortality and morbidity. Neonates born to preeclamptic mother are nearly 2-fold at higher risk of neonatal death and at increased risk of neonatal suffering including poor APGAR scores, abnormal body movement and admission to neonatal intensive care unit5,6.

The markedly increased incidence of perinatal mortality seen in pregnancies affected by preeclampsia, although multifactorial, is mainly due to the need for preterm delivery and uteroplacental ischemia resulting in a poor blood flow towards the fetus[7].

The chance of severe preeclampsia is significantly increased in a woman with history of preeclampsia, with diabetes mellitus, chronic hypertension and multiple pregnancy[8].

Neonates born to preeclamptic mother are at higher risk of neonatal death and at increased risk of neonatal morbidity including low APGAR scores, seizures, and admission to neonatal intensive care unit5,6. Sadly, the poor perinatal of preeclampsia is more pronounced in developing countries than the developed ones due to destitute care provided to the newborns .

Even though there are few studies exploring hypertensive disorders of pregnancy in Ethiopia, there is a paucity of information regarding maternal and perinatal outcomes of preeclampsia in Tigray region and in Ethiopia at large. This study will generate information regarding the determinants of maternal and perinatal outcome, which may help in devising management protocols.

This study aimed to determine the prevalence of pre-eclampsia, and to assess the maternal and perinatal outcomes.

METHODS

The study design was a retrospective record review of all cases diagnosed to have and managed for preeclampsia in Ayder Comprehensive Specialized Hospital (ACSH) between September 1, 2015 and August 31, 2018. ACSH is located in Mekelle town, Tigray 783 km north of Addis Ababa (capital city of Ethiopia). ACSH is a teaching hospital for both undergraduate and postgraduate students and has 24 hours a day specialty care. Currently it is the second largest public hospital in Ethiopia serving catchment area for 8 million people from Tigray, Afar, and Amhara regional states. It is a tertiary hospital giving all types of care. In obstetrics and gynecology department, there are one sub specialist, 10 specialists, 35 residents and 75 midwives. The evaluations of patients are made by midwives, medical interns, residents, and seniors.

Operational definition

Unfavorable maternal outcome included maternal death, eclampsia, HELLP syndrome, pulmonary edema, hepatic hematoma, and intracranial/intracerebral hematoma.

Poor perinatal outcome included stillbirth, early neonatal death, low APGAR

Perinatal death included stillbirth and early neonatal death

Low APGAR score is fifth minute APGAR score < 6, excluding zero

Incomplete chart is a chart which lacks delivery summary (maternal vital sign at delivery, birth weight, neonatal sex, 5th minute APGAR score) and preeclampsia chart.

Pulmonary edema was defined as respiratory failure, confirmed by typical findings on chest X-ray or clinical chest findings).

Intracerebral hemorrhage was diagnosed by computerized tomography performed on clinical suspicion.

Hepatic hematoma is patients with severe upper quadrant abdominal pain with ultrasound confirmation.

Sever BP measurement is if SBP> 160 and / or DBP 110 mmHg

Elevated AST is AST value > 60

Elevated ALT is ALT value > 60

Elevated creatinine is creatinine value > 1.2

Low platelet is platelet count <100,000

Preeclampsia includes atypical preeclampsia and superimposed preeclampsia.

Preeclampsia with severity features is Preeclampsia with any of the following clinical presentation: cortical symptoms, vascular symptoms, eclampsia, pulmonary edema, sever BP measurement elevated liver enzymes, elevated creatinine, low platelet, and hepatic hematoma Emergency log book, labor ward log book, patients' card and gynecologic ward log book were used as a source of data. The data was collected by two midwives, two-year one obstetrics and gynecology residents, and five interns. Descriptive analysis and logistic regression were completed using SPSS version 20 (IBM, Armonk, NY, USA). Those variables with a P value<0.1 at univariate level were considered for binary logistic regression. P value <0.05 was taken as statistically significant. The study was approved by the research and community service committee of Mekelle University, College of Health Sciences. The data was not used for other purpose other than the objective of the study. Confidentiality of data obtained from chart review was maintained.

RESULTS

During the 3 years study period; the total number of deliveries was 8,502. There were 432 patients with preeclampsia, giving a magnitude of 5.08%. It was possible to retrieve the charts of 402 cases (93.05 chart retrieval rate). Forty patients were excluded because they had incomplete chart. The remaining analysis was made using 362 cases.

Majority 56.4 % of the mothers were in the age range between 25 to 34 years with a median age and standard deviation (SD) of 27 years (SD ± 5.27). The minimum and maximum ages of patients were 18 and 43 years respectively.

Majority 249 (69.8%) of the patients belong to rural residence. The mean parity was 1.5 and 33.4 % were primigravida. Seventy-four patients (20.4%) had previous history of abortion, and 95.8% of the patients received at least one antenatal care.

There were 6 patients who had previous preeclampsia one of which had unfavorable maternal outcome and 7 (1.9%) of the mothers in this study had chronic hypertension. There were 14 patients with twin pregnancies.

Table 1 Demographic characteristic of women with preeclampsia in ACSH September 2015-August 2018.

Characteristics	N	%
Maternal age		
18-24	115	31.8
25-34	204	56.4
>=35	43	11.8
Parity		
Primigravid	121	33.4
Multigravida	241	66.6
Locality		
Rural	249	68.8
Urban	113	31.2
ANC Booking status		
Unbooked	15	4.2
Booked	347	95.8
Gestational age in weeks at time of diagnosis		
<34	93	25.7
>34	241	66.6
Unknown	28	7.7

The most common presenting symptom was headache with 134 (37%). Other symptoms experienced were epigastric pain 91(25.1), right upper quadrant pain 80 (22.1 %), blurring of vision 69 (19.1%), and sever BP measurement 64 (17.7 %).

There were 71(19.6%) patients who were anemic. Other laboratory results were elevated aspartate transaminase (AST) 104 (28.7%), elevated alanine transaminase (ALT) 41 (11.3%), elevated creatinine 46 (12.7%), and low platelet 16 (4.4%).

Majority (66%) of the patients were diagnosed with preeclampsia at the gestational age of 34 weeks or above with mean gestational age and standard deviation (SD) of 35.3 weeks (SD±4.5). The minimum and maximum gestational age at diagnosis were 20 and 43 weeks respectively. Preeclampsia with severity features was the most prevalent diagnosis made to 280 (77.3 %) of the mothers.

There were 44 (12.2%) patients with unfavorable maternal outcomes. The unfavorable maternal outcomes reported in this study were eclampsia 24 (6.6%), HELLP syndrome 16 (4.4%), maternal death 10(2.8%), renal failure 4 (1.1%), pulmonary edema 3 (0.8%), intracranial hemorrhage 3 (0.8%), and hepatic hematoma 2 (0.6). Other obstetric complications were abruptio placenta 23 (6.4%) and oligohydramnios 8 (2.2%).

Table 2 Maternal outcomes of mothers with preeclampsia in ACSH, September 2015-August 2018

Maternal outcomes	N	%
Unfavorable outcomes		
Eclampsia	24	6.6
HELLP syndrome	16	4.4
Maternal death	10	2.8
Renal failure	4	1.1
Pulmonary edema	3	0.8
Intracranial hemorrhage	3	0.8
Hepatic hematoma	2	0.6
Obstetric complications		
Abruptio placenta	23	6.4
Oligohydramnios	8	2.2

The median prolongation of the pregnancy from diagnosis to termination of pregnancy was 1.82 days (range 0-42 days). Most of the mothers achieved vaginal delivery after induction 143 (39.5%), spontaneous vaginal delivery 142 (39.2%), emergency cesarean delivery 57 (15.7%), elective cesarean delivery 14 (3.8%), forceps delivery 4 (1.1%), and destructive delivery was done for two patients.

Table 3 Perinatal outcomes of mothers with preeclampsia in ACSH, September 2015-August 2018

Perinatal outcome	Type of preeclampsia	
	Preeclampsia without severity features N (%)	Preeclampsia with severity features N (%)
Birth weight in grams		
Weight >2500	68 (18.8)	161 (44.5)
Weight 1500-2499	13 (3.6)	93 (25.7)
Weight 1000-1499	1(0.3)	24 (6.6)
Poor Perinatal outcome		
Stillbirth	3 (0.8)	18 (4.9)
Early neonatal death	1(0.3)	3 (0.8)
Low APGAR score	9 (2.5)	59 (16.3)
Abortion	-15 (4.1)	

There were a total of 361 neonates and 15 abortions. The mean birth weight at delivery was 2570 grams. Normal birth weight (>2500 grams) accounted for 63.3%, low birth weight (1500-2499 grams) for 29.3%, and very low birth weight (1000-1499 grams) for 6.9%. Low birth weight and preterm deliveries were common in women who have preeclampsia with severity features than in those who were having preeclampsia without severity features. The mean gestational age at delivery was 36 weeks, term delivery 189 (52.2%), preterm delivery 130 (35.9), and unknown gestational age 28 (7.7%).

Of all cases 25% had poor perinatal outcome. The poor perinatal outcomes reported in this study were 25 perinatal deaths, giving perinatal mortality rate of 69.06 per thousand deliveries; 21 still births yielding the still birth rate of 5.81%; there were 4 early neonatal deaths, and 68 (18.8%) cases with low APGAR score.

Predictors of unfavorable maternal outcome

After univariate analysis, hemoglobin value at admission, gestational age at admission, aspartate amino transferase vale (AST), alanine amino transferase value (ALT), headache, right upper quadrant pain, blurring of vision, and address, were found to be candidates in the binary logistic analysis for the final model. Therefore, a multivariate approach was applied to determine which factors best explained and predict unfavorable maternal outcome. The outcome of the final multiple logistic regression models indicated that address, gestational age, ALT value, right upper quadrant pain stay dropped from the final model. In this analysis, abnormal AST value has significant statistical association with unfavorable maternal outcome of preeclampsia (AOR = 91.7, 95% CI: 3.08-2718.24). The presence of headache and blurring of vision as a presenting complaint have statistical association with unfavorable maternal outcome of preeclampsia (AOR = 32.26, 95% CI: 0.03-32.60) and (AOR = 9.1, 95% CI: 0 .02-62.10) respectively.

Table 4. Univariate and multivariate binary logistic regression on factors associated with unfavorable maternal outcomes.

Variable		Unfavorable maternal outcome	COR (95%CI)	AOR (95%CI)
Address	Rural	36	2.2 (0.99-4.90) *	6.8 (0.91-52.05)
	Urban	8	1	1
Gestational age	<34 weeks	23	3.84 (1.98-7.46) *	1.07 (0.19-5.98)
at diagnosis	>34 weeks	19	1	1
Headache	Yes	26	28 (0.09-67.80) **	32.26 (0.03-32.60) *
	No	18	1	1
Right upper quadrant pain	Yes	16	2.28 (0.23-8.64) *	7.90 (0.39-57.53)
	No	28	1	1
Blurring of vision	Yes	24	7.3 (0.70-26.9) *	9.09 (0.02-62.1) *
	No	20	1	1
AST	Elevated	37	21.28 (0.19-116.01) *	91.57 (3.08-2718.24) *
	Normal	6	1	1
ALT	Elevated	15	5.21 (0.19-11.60) *	4.34 (0.05-1.19)
	Normal	28	1	1
Hemoglobin	<10 g/dl	26	3.44 (1.77-6.76) *	15.94(2.34-108.81) *
	>10g/dl	18	1	1

AST- Aspartate amino Transferase, ALT- Alanine amino Transferase, 1- logical reference, *-P<0.05, *- P<0.01

Predictors of poor perinatal outcome

Address, gestational age at diagnosis, maternal age, parity, history of abortion, order of pregnancy, headache, right upper quadrant pain, blurring of vision, epigastric pain, AST, ALT, platelet, hemoglobin, and creatinine were included in the univariate analysis. Address, gestational age at diagnosis, and maternal age were statistically significant at a univariate level. After multivariate binary logistic regression, gestational age at diagnosis less than 34 weeks was found to have significant association with poor perinatal outcome (AOR = 2.15, 95% CI: 1.22-3.79).

Table 5. Univariate and multivariate binary logistic regression on factors associated with poor perinatal outcomes.

Variable		Unfavorable maternal outcome	COR (95%CI)	AOR (95%CI)
Address	Rural	62	2.2 (0.99-4.90) *	2.14(0.75-4.72)
	Urban	31	1	1
Gestational age at	<34 weeks	34	2.5 (1.49-4.37) **	2.15 (1.22-3.79) *
diagnosis in weeks	>34 weeks	56	1	1
Maternal age in years	>35	15	2.28 (0.26-10.42) *	2.01(0.31-9.65)
	18-34	78	1	1

1- logical reference, *-P<0.05, *- P<0.01,

DISCUSSION

The prevalence of preeclampsia observed in the present study (5.08%) is consistent with an institutional study done by Wagnew et al. in Ethiopia which reported proportion of 4.2%11. our studies prevalence is higher than a study done by Gaym et al. which was 1.2%. The discrepancy is explained by lower institutional delivery in the latter study[12].

In our study preeclampsia with severity features was the most prevalent diagnosis made (77.3 %). This may be due to late diagnosis of preeclampsia as most patients were diagnosed after 34 weeks considering the progressive nature. Moreover majority (69.8%) of the patients were rural dwellers leading to delayed seeking of medical care.

In this study, unfavorable maternal outcome was present in 12 % of the preeclampsia cases. This is lower than a retrospective cross sectional study conducted among women with preeclampsia/ eclampsia delivering in Addis Ababa selected government hospitals, with a presence of maternal complication for 36% of the cases. The decreased maternal complication might be attributable to difference in operational definition of unfavorable maternal outcome. Aspiration pneumonia was included as unfavorable outcome and diagnosis of HELLP syndrome was not clear in the latter study. Both HELLP syndrome and aspiration pneumonia contributed to majority of unfavorable maternal outcome in the retrospective cross-sectional study11. Eclampsia, HELLP syndrome and maternal death were the leading unfavorable maternal outcomes which is comparable to a study done by Seyum et al.13. In developing countries pregnancy related acute renal failure may be as high as 36% and is responsible for maternal mortality and morbidity14. Our study revealed the occurrence of acute renal failure to be 1.1%, which is relatively low this might be due to improved health care and more effective measures. More over our hospital is well equipped compared to other hospitals in low resource setting.

In this analysis, abnormal AST value has significant statistical association with unfavorable maternal outcome of preeclampsia. The odds of unfavorable maternal outcome is 90 times higher if the AST is elevated. This finding is in line with a study done by James N. Martin et al. which reported maternal complication to be associated with elevated liver enzymes15. The presence of headache and blurring as a presenting complaint were also associated with unfavorable maternal outcome. Both neurologic symptoms have been reported in previous studies to signify an imminent eclampsia10. Hemoglobin value less than 10 was associated with unfavorable outcome. Though this finding is consistent with previous reports, it might be problematic to identify if severe anemia was the cause or effect of preeclampsia in this study as the anemia was detected at admission and may have been a consequence of the disease process (hemolysis in HELLP syndrome).

In present study, there were 93 poor perinatal outcomes including 21 still births,5 early neonatal deaths, and 68 neonates with low APGAR score. Similar to this finding, previous studies reported neonates born to preeclamptic mothers have higher still birth rates and low 1st and 5th minute APGAR scores16,17. There was strong association between gestational age less than 34 weeks and poor perinatal outcomes. This finding is consistent with literatures which report rates of all poor birth outcomes were significantly higher among women with early gestational age at onset of preeclampsia (<34) compared with late onset(>34)[13,15,17,18].

The rate of low birth weight in this study was 35% which is consistent with a WHO secondary analysis which reported low birth rate of 32-36% for Sub-Saharan countries[19].

Limitation of the study

This study had limitations. Due retrospective nature of the study design, it was difficult to obtain some sociodemographic data. As a result, it was difficult to control all possible determinants of maternal and perinatal outcomes including confounders to the association of low hemoglobin value with poor maternal outcome. Due to smaller sample size wider range of confidence interval was observed for hemoglobin and AST at multivariate level. Additionally, since our data relied on record review, which might not be correctly recorded may introduce bias with gestational age.

CONCLUSIONS

The present study highlighted high magnitude of poor maternal and perinatal outcomes which is similar to studies done in developing countries. The analysis showed that headache, blurring of vision, low hemoglobin, and elevated AST value were associated with unfavorable maternal outcome, while early onset disease is associated with poor perinatal outcome. Thus highighting that, in a resource limited setting where predictive and diagnsotic tools are scarce, clinical profile of women can be taken into consideration for prediction of poor outcome. Further prospective study should be done to control the confounders not addressed in this retrospective study.

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