

# INCIDENCE, ASSOCIATED FACTORS AND OUTCOMES OF ANTEPARTUM HEMORRHAGE AT AYDER COMPREHENSIVE SPECIALIZED HOSPITAL AND MEKELLE GENERAL HOSPITAL, MEKELLE, TIGRAY, ETHIOPIA

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## ABSTRACT

**INTRODUCTION:** The leading cause of maternal mortality in the world is obstetric hemorrhage. Antepartum hemorrhage (APH) is defined as bleeding from or into the genital tract after 28 weeks of pregnancy and before delivery of the baby. Placenta previa and abruptio placenta are the two major causes of antepartum hemorrhage worldwide including in Ethiopia, and contribute significantly to obstetric hemorrhage which is the most common cause of maternal death in developing countries like Ethiopia. Hence, the present study assesses the prevalence, maternal and perinatal outcomes of APH at Ayder Comprehensive Specialized Hospital (ACSH) and Mekelle General Hospital (MGH).

**METHODOLOGY:** Hospital based prospective cross-sectional study was carried out at ACSH and MGH.

**RESULTS:** There were a total of 5368 deliveries in both hospitals over a period of six months between February, 1/2018 to July, 30/2018. During this period, 192 mothers were diagnosed to have APH making prevalence of 3.8 %. The major causes of APH were abruptio placenta in 89 (46.5 %) and placenta previa in 64 (33.3 %). Anemia and postpartum hemorrhage (PPH) were the main maternal complications, each accounting for 98(51%) and 25 (13%) respectively. There was one maternal death (0.5 %). Of the total 200 newborns, 26 (13 %) were stillbirth and there were 19 (9.5 %) early neonatal deaths that died in the first seven days of life after admission to NICU, making PMR of 22.5 %.

**CONCLUSION:** APH which is primarily caused by abruptio placenta and placenta previa significantly affects the maternal and perinatal outcomes ACSH and MGH compared to reports from other countries. Maternal address out of Mekelle, severe maternal anemia, and abruptio placenta are predictors of increased perinatal mortality.

**KEY WORDS:** APH, Placenta Previa, Abruptio Placentae, Ayder, Mekelle, Ethiopia

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## INTRODUCTION

Antepartum hemorrhage (APH) is defined as any bleeding from or into the genital tract after the period of viability and before the end of the second stage of labor<sup>1</sup>. Obstetric hemorrhage is the leading cause of maternal morbidity and mortality throughout the world and is responsible for one third of all pregnancy-related deaths in both high and low-income countries<sup>1, 2</sup>. According to the Center for Disease Control and Prevention, hemorrhage was a direct cause of maternal death in about 30% of cases<sup>2</sup>. It complicates about 2-5% of all pregnancies<sup>3</sup>. APH can be due to placenta previa, abruption placentae, indeterminate cause, or local causes of genital tract.

Maternal mortality due to APH has significantly decreased in developed countries to about 6/100000 live births due to better obstetrical care. Ethiopia has one of the world's highest maternal mortality ratios (MMRs) at 412 maternal deaths per 100,000 live births in 2016<sup>4</sup>. Despite reductions observed during the last decade, perinatal mortality also remained high compared to other developing and developed countries<sup>5</sup>. The average perinatal mortality rate in Ethiopia between 2006 and 2011 was 46 perinatal deaths per 1,000 pregnancies of seven or more months of gestation<sup>6</sup>. Obstetric hemorrhage remains one of the major leading causes of maternal death<sup>7,8</sup> and one of the primary obstetric causes of perinatal mortality<sup>9,10</sup>. Placenta previa is one of the major causes of antepartum hemorrhage and is defined as a placenta overlying or proximate to the internal cervical os. It complicates approximately 1 of every 200 births. Recently placenta previa is reclassified in to two categories: placenta previa and low-lying placenta<sup>11</sup>.

Placental abruption is the premature separation of a normally implanted placenta either partially or totally from its implantation site before delivery. It is initiated by hemorrhage in the decidua basalis which results in a retroplacental hematoma<sup>12</sup>.

Maternal and perinatal complications of antepartum hemorrhage are malpresentation, premature labor,

postpartum hemorrhage, shock, acute kidney injury, and retained placenta. It also includes higher rates of caesarean sections, peripartum hysterectomies, coagulation failure and death. Fetal complications are prematurity, low birth weight, intrauterine death, congenital malformations, and birth asphyxia<sup>13</sup>.

Studies on APH are limited in the study area. To this end, this study aims to assess the prevalence of maternal and perinatal outcomes of APH at Ayder Comprehensive Specialized Hospital (ACSH) and Mekelle General Hospital (MGH).

## METHODS

An institution-based prospective cross-sectional study design was employed at ACSH and MGH.

ACSH is a tertiary hospital with a catchment population of more than 9 million people of the regions of Tigray, Northern part of Afar and Northeast of Amhara. The hospital has 13 departments and 3 special units. The labor ward gives delivery service on average for around 500 mothers per month.

Mekelle General Hospital is one of the oldest regional hospitals that gives service currently mainly for residents of Mekelle city and neighboring districts. From its 9 departments, the labor ward is the famous ward in the city which gives delivery service to 400 mothers on average each month.

The study population were all mothers who were admitted to labor and maternity wards of both ACSH and MGH with the diagnosis of APH or who developed APH during labor and gave birth between February 1 and July 30, 2018; the study period.

The inclusion criteria were all patients with bleeding per vagina  $\geq 28$  weeks of gestation and before delivery of the last fetus or end of second stage of labor. The exclusion criteria were women who refused to take part in the study and those who had physical or mental infirmity which precluded them to take part in the study. All pregnant mothers who were admitted with APH or developed APH

during labor follow-up who fulfilled the inclusion criteria and who attended the ACSH and MGH labor wards during the study period were included in the study and were followed until discharge from the hospitals or seven days from birth, whichever came first. Data was collected prospectively using data collection sheet.

Coded and de-identified data was entered in SPSS version 23 statistical software. Bivariate logistic regression was used to see an association between independent variables and dependent variables. The primary outcome of the study was prevalence of APH and secondary outcomes were maternal outcome (maternal complication) and perinatal mortality. During the step-wise modeling for regression analyses, all variables of clinical importance or with p-value 0.25 and less on bivariate analysis were considered for inclusion in the multivariate analysis. Multivariate logistic regression was used to control the possible confounding effect of selected variables and to determine the independent predictors of maternal and perinatal outcomes of APH. Statistical significance was declared at  $p < 0.05$  [14]. The study received ethical approval (MU-IRB 1789/2018) from the Institutional Review Board of College of Health Sciences, Mekelle University, Mekelle, Ethiopia. Written informed consent was obtained from the study participants.

## RESULTS

### Sociodemographic characteristics

There was a total of 5368 deliveries in both ACSH and MGH between February 1/2018 to July, 30/2018. During this period, 192 mothers with APH were diagnosed, with prevalence of 3.8 %.

The mean age of the mothers was 29.31 year + 5.8 (18-46). More than two-thirds of women 132 (68.8 %) were in the age range of 21 to 34 years and one-fourth 49 (25.5%) were 35 years and older. Regarding marital status, 181 (94.3%) were currently married, 8 (4.2) were single, followed by 2 (1%) divorced and 1(0.5%) widowed.

Educational status showed that 68 (35.4%) were illiterate, 40 (20.8%) attended between grade 1 to 8, 48 (25%) attended grade 9 to 12, and 36 (18.8%) of them attended college or university. (Table 1)

**Table 1: Socio-demographic characteristics of mothers with APH at ACSH & MGH, Mekelle, Ethiopia, 2018**

Variables	(N)	(%)
<b>Age</b>		
20 or younger	11	5.7
21-34	132	68.8
35 or older	49	25.5
<b>Marital status</b>		
Married	181	94.3
Single	8	4.2
Divorced	2	1
Widowed	1	0.5
<b>Educational level</b>		
None	68	35.5
Primary (1 to 8)	40	20.8
Secondary (9 to 12)	48	25
College or University	36	18.8

### Reproductive and Obstetrical details

Regarding parity of mothers, 51 (26.6%) were primipara, 85 (44.3%) of them multiparous (Para II to IV) and 56 (29.2%) were grand multipara (>V). Three-quarters of the respondents had no history of abortion, and one-quarter had history of abortion at least once. 36 (18.8%) of those who had history of abortion, uterine curettage was done.

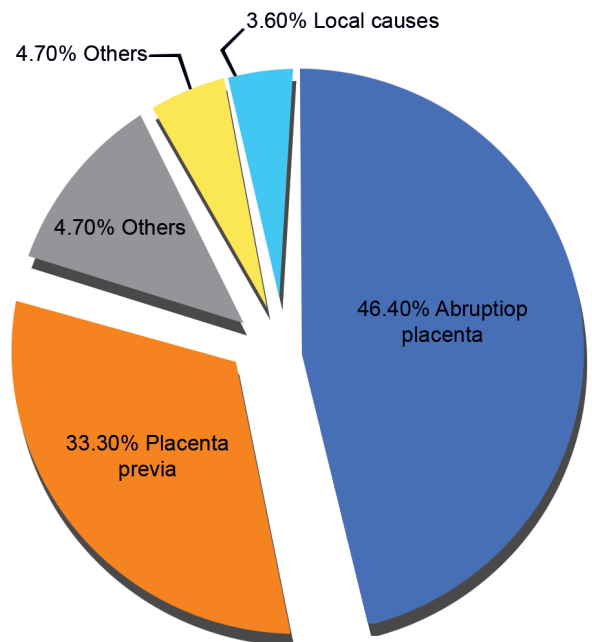
Pregnancy induced hypertension (PIH) was diagnosed in 20 (10.4 %) of mothers with APH in the current pregnancy. The most common type of PIH in the current pregnancy was preeclampsia/superimposed preeclampsia. There were also two mothers with eclampsia. Twenty-one (10.9 %) mothers were diagnosed with preterm rupture of membrane and 2(1 %) mothers sustained abdominal trauma during the current pregnancy (Table 2).

**Table 2: Reproductive and Obstetrical details of mothers with APH at ACSH & MGH, Mekelle, Ethiopia, 2018**

Variables	(N)	(%)
<b>Parity</b>		
I	51	26.6
II-IV	85	44.3
≥V	56	29.2
<b>History of abortion</b>		
None	145	75.5
One time	33	17.2
Two times	10	5.2
Three times and above	4	2.1
<b>History of uterine curettage</b>		
Yes	36	18.8
No	156	81.2
<b>Number of fetuses</b>		
Singleton	184	95.8
Twin	8	4.2
<b>Previous cesarean delivery</b>		
Once	18	72
Twice	6	24
Three times and above	1	4
<b>History of myomectomy</b>		
Yes	4	2.1
No	188	97.9
<b>Hypertensive disorder in current pregnancy</b>		
Yes	20	10.4
No	172	89.6
<b>Type of hypertensive disorder</b>		
Preeclampsia/superimposed	13	65
Gestational HTN	1	5
Chronic HTN	4	20
Eclampsia	2	10
<b>PPROM</b>		
Yes	21	10.5
No	171	89.1
<b>Trauma in current pregnancy</b>		
Yes	2	1
No	190	99
<b>History of APH</b>		
Yes1	0.5	
No 140	72.9	
Not applicable	51	26.6

### Causes of APH

The major causes of APH established as final diagnosis were abruptio placenta in 89 (46.5 %) and placenta previa in 64 (33.3 %) patients. Local causes, unexplained and others account for 7 (3.6 %), 23 (12.3 %) and 9 (4.7 %) respectively. The prevalence of abruptio placenta and placenta previa among mothers who gave birth during the study period in both hospitals were 1.7 % and 1.2 % respectively.



**Figure 1. Proportion of women by causes of APH (N=192) at ACSH and MGH, Mekelle, Tigray, Ethiopia, 2018**

### Maternal outcomes

More than half (51 %) of the mothers with APH were anemic (Hgb level < 11 gm /dl) and of these, 20 (10.4 %) had severe anemia (<7 gm/dl). PPH was the second most common complication of APH patients after anemia affecting 25 (13 %) mothers. Hysterectomy was done for 3 (1.6 %) patients with intractable PPH. There was one maternal death due to PPH during the study period (Table 4).

**Table 4: Maternal outcomes of APH at ACSH & MGH, Mekelle, Ethiopia, 2018**

Variables	(N)	(%)
<b>Hemoglobin level</b>		
≥ 11gm/dl	94	49
Mild Anemia(10-10.9 gm/dl)	40	20.8
Moderate anemia (7-9.9 gm/dl)	38	19.8
Severe Anemia (< 7 gm/dl)	20	10.4
<b>PPH</b>		
Yes	25	13
No	167	87
<b>Peripartum Hysterectomy</b>		
Yes	3	1.6
No	189	98.4
<b>DIC</b>		
Yes	2	1
No	190	99
<b>Puerperal sepsis</b>		
Yes	1	0.5
No	191	99.5
<b>Maternal death</b>		
Yes	1	0.5
No	191	99
<b>Other complications</b>		
Yes	4	2.1
No	188	97.9

### Perinatal Outcomes

A total of 200 babies were born to 192 mothers with APH. One hundred and eighty-four (95.8 %) were singleton pregnancies and eight (4.2%) were twin pregnancies. Of the total deliveries, 174 (87%) were born alive and 26 (13 %) were stillbirths. There were also 19 (9.5 %) early neonatal deaths (within 7 days of delivery) after admission to Neonatal Intensive Care Unit (NICU) making the perinatal mortality rate of 22.5 % among mothers with APH. The prevalence of prematurity (gestational age < 37 weeks) was 35.4 % and the low birth weight (Birth weight < 2500 gm) was 40 %. Seventy-four (42.5 %) of the neonates born alive were admitted to NICU (Tables 5).

**Table 5: Perinatal outcomes of pregnant mothers with APH at ACSH & MGH, Mekelle, Ethiopia, 2018**

Variables	(N)	(%)
<b>Gestational age at birth</b>		
28 -33weeks + 6 days	38	19.8
34 -36 weeks +6 days	30	15.6
37-41 weeks +6 days	120	62.5
≥42weeks	4	2.1
<b>Sex of neonate</b>		
Male	101	50.5
Female	99	49.5
<b>Fetal condition at birth</b>		
Alive	174	87
Stillbirth	26	13
<b>First minute APGAR score</b>		
≤ 3	2	1.1
4-6	52	29.9
≥7	120	69
<b>5<sup>th</sup> minute APGAR score</b>		
≤ 3	1	0.5
4-6	9	5.2
≥ 7	164	94.3
<b>Birth weight</b>		
< 1500 gm	12	6
1500-2499 gm	68	34
2500-3999 gm	117	58.5
≥ 4000 gm	3	1.5
<b>Admission to NICU</b>		
Yes	74	42.5
No	100	57.5
<b>Outcome within one week of NICU admission</b>		
Alive	55	74.3
Early neonatal death	19	25.7
<b>Causes of early neonatal death</b>		
RDS ( Prematurity)	10	52.6
Sepsis	2	10.5
Perinatal asphyxia	7	36.8

### Bivariate and multivariate analysis of factors associated with maternal and perinatal outcomes of APH

In the bivariate analysis of contributing factors such as address, maternal age, educational level, hypertensive disorders of pregnancy, cause of APH, mode of delivery, and history of cesarean

delivery as predictors of maternal complication, only the history of previous cesarean delivery was a significant predictor of maternal complications. Mothers with a history of cesarean delivery and currently with APH had 4.174 times higher maternal complications than those without history of previous cesarean delivery who were currently primipara (COR: 4.174; 95 % CI: 1.429,12.196). Regarding perinatal mortality predictors in the bivariate analysis, mothers with APH who came outside of Mekelle city had high odds of perinatal mortality. Mothers with a hemoglobin level (mild, moderate and normal), both placenta previa and unexplained APH, current cesarean delivery had lower odds of perinatal mortality when compared to those with hemoglobin level < 7gm/dl, abruptio placenta, and vaginal delivery respectively. The adjusted binary logistic regression model analysis of predicting factors of perinatal mortality in mothers with APH revealed that address, maternal hemoglobin level <7 (moderate, mild anemia and normal), placenta previa and unexplained APH were

independent predictors of perinatal mortality but the mode of delivery was not found to be significant in the adjusted binary logistic regression analysis. Newborns born to mothers with APH, who came outside of Mekelle, were 2.749 times more likely to die during the perinatal period when compared to mothers who came Mekelle (where the study area is located) (AOD: 2.7491; 95% CI:1.241,6.090). Neonates born to mothers with APH but no anemia, 0.110 times, mothers with mild anemia 0.144 times and moderate anemia 0.087 times less likely to die during their perinatal life as compared to mothers with APH who had had severe anemia (AOR: 0.110; 95% CI: 0.032-0.380, 0.144; 95% CI: 0.037-0.561,0.087;95 % CI: 0.021-0.366) respectively. Mothers who had placenta previa as a cause of APH and unexplained APH had 0.232 and 0.153 times less perinatal mortality compared to those with abruptio placenta (AOR:0.232; 95% CI: 0.080-0.674, 0.153; 95% CI: 0.042-0.552) respectively (Table 6). (Table 6).

Table 6: Bivariate and Multivariate analysis of factors associated with perinatal mortality of mothers with APH at ACSH and MGH, Mekelle, Ethiopia, 2018

Variable	Perinatal mortality		Crude OR(95 % CI)	Adjusted OR(95 % CI)
	Yes	No		
<b>Address</b>				
Mekelle	13 (6.8%)	84(43.7%)	1	1
Out of Mekelle	32(16.7%)	63 (32.8%)	3.282(0.1.593,6.761) *	2.749(1.241,6.090) *
<b>Hemoglobin level</b>				
≥11gm/dl	17 (8.8%)	77 (40.1%)	0.147(0.052,0.415) *	0.110(0.032,0.380) *
10-10.9 gm/dl	10 (5.2 %)	30 (15.6%)	0.222(0.071,0.699) *	0.144 (0.037,0.561) *
7-9.9 gm/dl	6 (3.1 %)	32 (16.7%)	0.125(.036,0.436) *	0.087 (0.021,0.366) *
<7 gm/dl	12 (6.3%)	8 (4.2 %)	1	1
<b>Causes of APH in current pregnancy</b>				
Abruptio placenta	33 (17.2 %)	56 (29.2 %)	1	1
Placenta previa	8 (4.2 %)	56 (29.2 %)	0.242 (0.103,0.571) *	0.232(0.080,0.674) *
Unexplained/ Local causes/Other	4(2.1%)	35(18.2 %)	0.194 (0.063,0.595) *	0.153 (0.042,0.552) *
<b>Mode of delivery</b>				
Vaginal delivery	26 (13.5%)	60(31.3%)	1	1
Cesarean delivery	19 (9.9 %)	87(45.3 %)	0.504 (0.256,0.992) *	1.520 (0.645,3.580)

\* Statistical significance ≤ 0.05, OR=Odds Ratio, CI=Confidence Interval

## DISCUSSION

The main objective of this study was to assess the prevalence of maternal and perinatal outcomes, and associated factors of mothers with APH in ACSH and MGH from February 1/2018 to July 30/2018. In the present study, there were 192 cases of APH out of 5,368 deliveries making prevalence of APH 3.8 %. Abruptio placenta and placenta previa were the main causes of APH in the current study, accounting for 46.4 %, and 33.3 % respectively. The prevalence of abruptio placenta was 1.7 % and placenta previa 1.2 %. The mean maternal age was 29.3 with standard deviation of 5.8. The mode of delivery was cesarean delivery in 55.2 % of the patients. Anemia and post-partum hemorrhage were the two most common complications. There was one maternal death during the study period related to PPH. The perinatal mortality rate was 22.5 %. The prematurity rate and low birth rate were 35.4 % and 40 %, respectively.

The prevalence of APH in this study is consistent with study done in India<sup>15</sup> but higher than studies done in other parts of India and Nigeria<sup>16-18</sup>. Compared to a study conducted in Jimma University Specialized Hospital in the Oromia region, the prevalence is lower. This may be due to the low institutional delivery in the Oromia region which was 18.8 % and relatively higher in the Tigray region which was 56.8 % according to the 2016 EDHS report<sup>4</sup>.

The mean age of the study participants was 29.3 years, which is within the age range of 18-46 years with a standard deviation of 5.8. This contrasts with the traditional association of antepartum hemorrhage with advanced maternal age<sup>19</sup>.

Abruptio placenta and placenta previa were the two major causes of APH in our study each accounting for 46.4 % and 33.3 % respectively which is consistent to studies done elsewhere<sup>17,18,20</sup>. The study revealed that almost half of the cases were anemic (51 %) and 13% of them developed PPH. This finding is lower than the study conducted in India (71.9 %)<sup>6</sup>. This may be due to the relatively less history of previous cesarean delivery and

current cesarean delivery in our study area. Many studies have shown that increased rate of previous cesarean delivery is associated with increased rate of placenta previa and morbidly adherent placenta which led to increased risk of anemia, PPH and cesarean hysterectomy<sup>12,21</sup>.

There was one maternal death (0.5 %) during the study period and the cause of the death was PPH. Compared to studies done in low-and middle-income countries<sup>16-18,20,22</sup>, this rate of maternal death related to APH was lower than studies conducted in low- and middle-income countries<sup>16-18,20, 22</sup>, but higher than in a study report from France where there was no maternal mortality related to APH<sup>23</sup>. This low rate of maternal death secondary to APH compared to many other regions of the country and other countries may be due to improved timely referral, road access and increased health seeking behavior.

The mode of delivery was cesarean delivery in 55.2% of APH mothers and out of those with placenta previa 92.2 % of them gave birth by cesarean delivery. This finding is consistent with studies done in other parts of Ethiopia and Africa<sup>18,20</sup>, but lower than studies done in India<sup>13,15</sup>.

Adjusted binary logistic regression model demonstrated also that address and level of maternal hemoglobin were significantly associated with perinatal mortality. These independent predicting factors were also found to contribute to PMR in another study<sup>20</sup>.

The main causes of early neonatal death in the study were respiratory failure and perinatal asphyxia. This finding is in congruence with other studies<sup>15,20</sup>. Quality of intrapartum care, appropriate neonatal resuscitation, and other NICU services are therefore a critical component of the continuum of care to prevent early neonatal death. The care study did not assess the processes in the NICU; however, the high mortality rate among neonates admitted to the NICU compared to findings from other studies<sup>20,24</sup> is an indicative of the need for improvement in the quality of NICU services in the study hospitals.

## **CONCLUSION**

The study showed that the prevalence of APH to be 3.8 %. The prevalence of abruptio placenta was 1.7 % and placenta previa 1.2 %. There was one maternal death during the study period related to PPH. The perinatal mortality rate was 22.5 %. The prematurity rate and low birth rate were 35.4 % and 40 %, respectively.

## **LIMITATION OF THE STUDY**

The most important limitation lies in the fact that the number of maternal death (1) and perinatal death (19) was relatively small for regression modeling.

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