

MAGNITUDE, CONTRIBUTING FACTORS AND FETOMATERNAL OUTCOMES OF PLACENTA PREVIA: A MATCHED CASE- CONTROL STUDY AMONG MOTHERS DELIVERED AT JIMMA MEDICAL CENTER, SOUTHWEST ETHIOPIA

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ABSTRACT

BACKGROUND: Placenta previa is an abnormally positioned placenta in the lower uterine segment, which can partially or completely cover the cervix. It complicates approximately 3–5 per 1,000 pregnancies worldwide and is becoming more common due to increasing cesarean section rates. This condition is associated with maternal and neonatal morbidity and mortality.

METHODOLOGY: A facility-based observational matched case-control study was conducted from November 2020 to September 2021 among 450 pregnant women with placenta previa. Controls were matched with cases by age and parity. Data were cleaned, coded, and entered into SPSS version 26.0. Descriptive statistics were used to summarize categorical variables. Bivariable and multivariable logistic regression analyses were employed to identify associations between dependent and independent variables. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) and a p-value < 0.05 were considered statistically significant. Results were compiled and presented in tables and charts.

RESULTS: The magnitude of placenta previa was 15 per 1,000 deliveries. A previous history of spontaneous incomplete abortion (AOR: 11.06; 95% CI: 1.41–86.82) was a significantly identified risk factor. The need for blood transfusion (AOR: 15.69; 95% CI: 4.28–57.53), operation under general anesthesia (AOR: 6.27; 95% CI: 1.74–22.57), hospital stay longer than four days (AOR: 16.62; 95% CI: 6.78–40.75), and anemia with hemoglobin < 11 g/dL (AOR: 8.22; 95% CI: 2.17–31.05) were significantly associated maternal complications. Admission to the NICU among newborns of mothers with placenta previa (AOR: 10.95; 95% CI: 1.37–87.32) was a significantly identified neonatal complication (p < 0.05).

CONCLUSION: A previous history of spontaneous incomplete abortion was a significant risk factor for placenta previa. Maternal complications associated with placenta previa included the need for blood transfusion, anemia (hemoglobin < 11 g/dL), exposure to general anesthesia, and prolonged hospital stay. The major neonatal complication associated with placenta previa was an increased risk of NICU admission.

KEYWORDS: Placenta previa, Maternal complications, Neonatal complications, Ethiopia

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INTRODUCTION

The term “placenta previa,” derived from Latin meaning “preceding placenta,” describes the positioning of the placenta in the lower uterine segment, often situated directly over or close to the internal cervical os¹. This condition is marked by the abnormal placement of the placenta, which may cover the cervix and result in antepartum hemorrhage².

Placenta previa is categorized into four types: complete, partial, marginal, and low-lying, with the low-lying type being the most common, found in 74.9% of cases¹. The classification may change with cervical dilation, affecting both diagnosis and management³. Additionally, it can be divided into true placenta previa and low-lying placenta based on the placenta’s position relative to the cervical os⁴.

The incidence of placenta previa ranges from 3 to 5 cases per 1,000 pregnancies and has been on the rise, partly due to increased cesarean deliveries. This condition is more frequently observed in mid-pregnancy and often resolves as the uterus enlarges². Typically, placenta previa presents as painless vaginal bleeding in the later stages of pregnancy, often occurring unexpectedly and requiring hospitalization for monitoring⁵. Diagnosis is primarily performed using ultrasound, with transvaginal ultrasound being the most accurate method⁶. Management strategies depend on gestational age and the severity of bleeding, often necessitating cesarean delivery for confirmed cases⁷. When placenta previa manifests as antepartum hemorrhage in the third trimester, it represents a serious obstetric emergency that can lead to significant maternal morbidity and mortality, particularly in developing countries with limited healthcare resources². Bleeding may occur as the uterus prepares for delivery, especially as the cervix effaces and dilates, potentially detaching the placenta⁸. Furthermore, the condition is linked with an increased risk of surgical complications, including cesarean hysterectomy and considerable blood loss⁴.

Risk factors for placenta previa include advanced maternal age, multiparity, smoking, infertility treatments, previous cesarean sections, dilatation and curettage, and a history of placenta previa—all of which have increased over the past decade^{9–14}.

Infants born to mothers with placenta previa are at a higher risk for preterm birth, congenital malformations, low birth weight, and low APGAR scores, often requiring NICU admission^{13,15–19}. Maternal complications may include severe hemorrhage and placenta accreta, while neonatal risks include preterm birth and low APGAR scores¹. Complications can also persist into the postpartum period, resulting in higher cesarean delivery rates and increased postpartum anemia^{4,20–22}.

In Ethiopia, comprehensive epidemiological data on placenta previa remain limited. Socioeconomic, environmental, and healthcare access factors that influence fetomaternal outcomes are poorly understood. This information is essential for shaping clinical management. Therefore, this study aimed to assess the incidence, contributing factors, and perinatal outcomes of placenta previa among mothers who delivered at Jimma Medical Center, Southwest Ethiopia. The findings are expected to inform the development of updated management guidelines for improved patient care.

Methods and Materials

The study was conducted at Jimma Medical Center (JMC) from November 2020 to September 2021. JMC, established in 1937, is the oldest public hospital in southwestern Ethiopia and serves as a teaching and referral facility. The study employed a hospital-based prospective observational matched case-control design, matching controls with cases by age and parity. Maternal age was categorized into three groups: ≤ 20 years, 21–34 years, and ≥ 35 years, while parity was divided into three categories: Para 1, Para 2–4, and Para ≥ 5 , with a 4:1 control-to-case ratio.

The study population included all singleton pregnancies complicated by placenta previa at JMC during the study period. Inclusion criteria for cases were pregnancies diagnosed with placenta

previa via ultrasound during the third trimester, while controls were singleton pregnancies without placenta previa. Women with multiple gestations were excluded to avoid overrepresentation of high-risk cases.

Sample size calculations were based on previous studies, using proportions of 0.223 for cases and 0.085 for controls²³, with a desired statistical power of 90% and a case-to-control ratio of 1:4, yielding a final sample size of 450. Data collection involved interviews and patient records, with maternal and fetal outcomes monitored throughout. Dependent variables focused on perinatal outcomes, while independent variables included sociodemographic, obstetric, maternal, and fetal factors.

Data were collected using a checklist that gathered information on sociodemographic characteristics, obstetric history, current pregnancy details, mode of delivery, comorbidities, and maternal and fetal complications. The questionnaire, initially in English, was translated into Amharic and Afan Oromo for interviews with patients or family members. To ensure data quality, a two-day training session was conducted for data collectors, and data from cases and controls were collected by different personnel to avoid bias.

Data were processed and analyzed using EPI Data and SPSS. Descriptive and logistic regression analyses were performed, and a p-value < 0.05 in multivariate logistic regression was considered statistically significant. Ethical approval was obtained from the Institutional Review Board of Jimma University, and confidentiality was maintained throughout the study.

Results

Socio Demographic Characteristics of Cases and Controls

Out of the planned 450 samples (90 cases and 360 controls), a total of 395 participants (79 cases and 316 controls) were recruited, resulting in a response rate of 87.8%. During the period from November 2020 to September 2021, there were 5,460 deliveries at JMC, of which 81 (1.48%) were complicated

by placenta previa. Among these cases, two were twin pregnancies, while the remaining 79 were singleton pregnancies. For subsequent analysis, only singleton pregnancies were included to avoid overrepresentation of high-risk women.

The majority of participants are young adults aged 21-34, with mean ages of 28.03 ($\pm$ 5.10) years for cases and 28.27 ($\pm$ 5.18) years for controls, respectively.

Ethnically, Oromo is predominant, followed by Amhara and Kefa respectively. Marital status shows that 99% of the participants are married. In terms of religion, 66.1% are Muslim. Educational attainment is low, with 32.9% unable to read or write. Occupationally, a significant portion were housewives (32.7%). The residency distribution indicates that 58.2% residing in urban settings (Table 1).

Table 1: Distribution of the study participants by their socio demographic characteristics, Jimma Medical Center, southwestern Ethiopia, November 2020 to September 2021

Socio Demographic Characteristics		Cases N= 79		Controls, N=316		Total, N=395	
		F	%	F	%	F	%
Age	≤ 20	5	6.3	20	6.3	25	6.3
	21-34	59	74.7	236	74.7	295	74.7
	≥ 35	15	19.0	60	19.0	75	19
Ethnicity	Oromo	56	70.9	227	71.8	283	71.9
	Amhara	9	11.4	49	15.6	58	14.4
	Kefa	6	7.6	8	2.5	14	3.5
	Others	8	10.1	32	10.1	40	10.2
Marital Status	Single	1	1.3	-	-	1	.3
	Married	78	98.7	313	99.1	391	99.0
	Widowed	-	-	3	.9	3	.8
Religion	Muslim	54	68.4	207	65.5	261	66.1
	Orthodox	21	26.6	77	24.4	98	24.8
	Protestant	4	5.1	32	10.1	36	9.1
Level of Education	Can't read and write	36	45.6	94	29.7	130	32.9
	Can read and write	-	-	41	13.0	41	10.4
	Primary school	26	32.9	73	23.1	99	25.1
	Secondary and preparatory	7	8.9	28	8.9	35	8.9
	TVET	4	5.1	49	15.5	53	13.4
	Degree and Above	6	7.6	31	9.8	37	9.4
Occupation	Professional	10	12.7	77	24.4	87	22.0
	Farmer	11	13.9	33	10.4	44	11.1
	Sales and Service	11	13.9	62	19.6	73	18.5
	Student	15	19.0	47	14.9	62	15.7
	House wife	32	40.5	97	30.7	129	32.7
Residency	Urban	21	26.6	209	66.1	230	58.2
	Rural	58	73.4	107	33.9	165	41.8

Obstetric characteristics of the cases and controls

Regarding parity, majority 42 (53.2%) were Para two to Para four. A notable difference was observed in the history of abortion, where 46.8% of cases reported at least one abortion compared to only 14.2% of controls, resulting in a total of 20.8% across all participants. Among those with a history of abortion, 64.6% had spontaneous abortions. Regarding previous cesarean deliveries, 20.3% of cases and 6.4% of controls had a history of cesarean, highlighting a total of 9.2% across the study population. Most participants (96.2%) received antenatal care, with no significant

difference between cases and controls. In terms of gestational age at delivery, 17.2% were preterm, with a significant disparity as 48.1% of cases were preterm compared to only 9.5% of controls. Notably, 100% of the cases (79 participants) underwent cesarean delivery, while only 29.7% of controls (94 participants) had a cesarean section, resulting in an overall cesarean delivery rate of 43.8%. In contrast, vaginal deliveries were absent among cases, with 60.8% of controls (192 participants) having vaginal deliveries, general anesthesia was utilized in 44 cases, accounting for 55.7% of the total (Table 2).

Table 2 : Obstetric Characteristics of Cases and Controls among deliveries conducted at Jimma Medical Center, southwestern Ethiopia, November 2020 to September 2021

Obstetric Characteristics		Cases N= 79		Controls, N=316		Total, N=395	
		F	%	F	%	F	%
Parity	I	18	22.8	72	22.8	90	22.8
	II – IV	42	53.2	168	53.2	210	53.2
	≥ V	19	24.1	76	24.1	95	24.1
Previous history of Abortion	Yes	37	46.8	45	14.2	82	20.8
	No	42	53.2	271	85.8	313	79.2
The Type of Abortion (n=82)	Induced	13	16.5	14	4.4	27	32.9
	Spontaneous Complete	2	2.5	23	7.3	53	64.6
	Incomplete	21	26.6	7	2.2		
	Both (Induced and Spontaneous)	1	1.3	1	0.3	2	2.4
Previous history of placenta previa	Yes	3	3.8	0	0.8	3	0.8
	No	76	19.4	316	80.0	392	99.2
Previous cesarean delivery	Yes	16	20.3	20	6.4	36	9.2
	No	63	79.7	296	93.6	359	90.8
Types of previous CS Delivery(n=36)	Emergency	14	2.5	8	2.5	22	61.1
	Elective	2	17.7	12	3.8	14	38.9
ANC (current)	Yes	76	96.2	304	96.2	380	96.2
	No	3	3.8	12	3.8	15	3.8
Method of Gestational Age Calculated(current)	LNMP	18	22.8	113	35.8	131	33.2
	Early 1 st Trimester Ultrasound	3	3.8	13	4.1	16	4.1
	Early 2 nd Trimester ultrasound	3	3.8	42	13.3	45	11.4
	Ballard Score	51	64.6	134	42.4	185	46.8
	Unknown	4	5.1	14	4.4	18	4.6
Gestational Age at Delivery(current)	Preterm (28-36.6)	38	48.1	30	9.5	68	17.2
	Term (37-38.6)	35	44.3	257	81.3	292	73.9
	Post Term(≥ 42)	2	2.5	15	4.7	17	4.4
	Unknown GA	4	5	14	4.4	18	4.5
Mode of Delivery	Vaginal Delivery	0	0	192	60.8	192	48.6
	Operative Vaginal Delivery	0	0	13	4.1	13	3.3
	Destructive Vaginal Delivery	0	0	3	0.9	3	0.8
	Ceserean Delivery	79	100	94	29.7	173	43.8
	Assisted Vaginal Breech Delivery	0	0	9	2.8	9	2.3
	Laparatomy for uterine rupture	0	0	5	1.6	5	1.3
Used anesthesia type	General	44	55.7	13	13.1	57	32.0
	Spinal	35	44.3	86	86.9	121	68.0

Types of Placenta Previa

Of the total 5,460 deliveries during the study period, 81 mothers with placenta previa, accounting for 1.48% (about 15 cases per 1,000 deliveries), were identified. The majority of cases had true placenta previa, accounting for 61 (77.2%), while the rest were classified as low-lying placentation, accounting for 18 (22.8%). The overall distribution is shown in the figure below (Fig 1).

Types of Placenta Previa

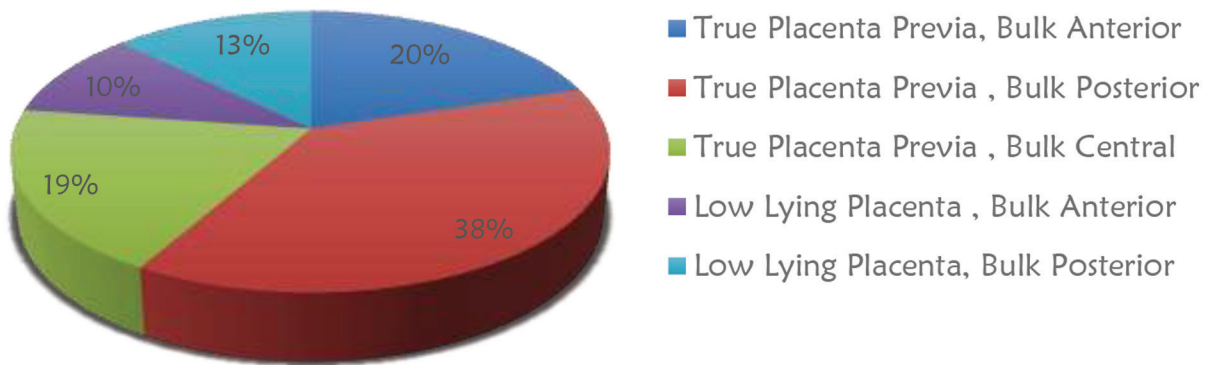


Figure 1: Distribution of types of placenta previa among deliveries conducted at Jimma Medical Center, southwestern Ethiopia, November 2020 to September 2021

Table 3 : Binary and multivariate logistic regression analyses of risk factors for placenta previa among deliveries conducted at Jimma Medical Center, southwestern Ethiopia, November 2020 to September 2021

Risk Factors	Case N:(79)		Control N:(316)	COR(95%CI)	AOR(95%CI)
Previous Spontaneous Incomplete Abortion	Yes	21	7	15.98 (6.50,39.32)	11.06 (1.41, 86.82)*
	No	58	309	1	
Induced Abortion	Yes	13	14	4.322 (1.99, 9.39)	2.23(0.08, 63.08)
	No	66	302	1	
Previous History of Cesarean Delivery	Yes	16	20	3.73 (1.83, 7.61)	0.002 (0.00, 4.08)
	No	63	296	1	
Preexisting Problem and Chronic Illness	Yes	19	24	3.853 (1.99, 7.48)	11.06 (0.91, 133.83)
	No	60	292	1	

COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio , *Statistically Significant variables at $P < 0.05$

Neonatal Outcomes for Cases and Controls

Table 4 presents a comparative analysis of neonatal outcomes between cases and controls. Most infants were delivered in a cephalic presentation, with 87.3% of cases and 91.8% of controls. In terms of sex distribution, 54.4% of cases and 53.2% of controls were male. Regarding birth outcomes, 79.7% of cases were alive at birth compared to 91.8% of controls, with stillbirths reported at 5.1% in cases and 5.4% in controls. Early neonatal death (ENND) was notably higher in cases at 15.2% versus 2.8% in controls. The APGAR score was less than

seven in 25.3% of cases and 16.1% of controls at 1st minute. Birth weight analysis revealed that 35.4% of cases were classified as low birth weight (LBW), whereas only 9.5% of controls fell into this category. NICU admissions were significantly higher in cases at 37.3% compared to 13.0% in controls. Among newborns admitted to the NICU, 53.6% of cases improved by discharge, while 39.3% experienced ENND. Lethal congenital anomalies were present in 2.5% of cases and 0.9% of controls. Overall, the study revealed that 20.3% of cases faced adverse outcomes, compared to 8.2% in controls (Table 4)

Table 4: Neonatal outcomes of cases and controls among deliveries conducted at Jimma Medical Center, southwestern Ethiopia, November 2020 to September 2021

Neonatal outcomes		Cases N= 79		Controls, N=316		Total, N=395	
		F	%	F	%	F	%
Fetal presentation at delivery	Cephalic	69	87.3	290	91.8	359	90.9
	Breech	7	8.9	19	6.0	26	6.6
	Transverse	3	3.8	2	0.6	5	1.3
	Others	-	-	5	1.6	5	1.3
FHB at presentation	Positive	74	93.7	301	95.3	375	94.9
	Negative	5	6.3	15	4.7	20	5.1
	Sex	43	54.4	168	53.2	211	53.4
	Female	36	45.6	148	46.8	184	46.6
Birth Outcome	Alive	63	79.7	290	91.8	353	89.4
	Still birth	4	5.1	17	5.4	21	5.3
	ENND	12	15.2	9	2.8	21	5.3
1 st min APGAR Score	<7	19	25.3	48	16.1	67	17.9
	≥7	56	74.7	251	83.9	307	62.1
5 th min APGAR Score	<7	9	12	1	0.3	10	2.7
	≥7	66	88	298	99.7	364	97.3
Birth Weight in gram	1000-1499	10	12.7	8	2.5	18	4.6
	1500-2499	28	35.4	30	9.5	58	14.7
	2500-3999	41	51.9	258	81.6	299	75.7
	≥4000	-	-	20	6.3	20	5.1
NICU Admission	Yes	28	37.3	39	13.0	67	17.9
	No	47	62.7	260	87	307	82.1
Status of Newborns admitted to NICU at discharge	Improved	15	53.6	28	68.3	43	62.3
	Discharged with sequale	-	-	2	4.9	2	2.9
	ENND	11	39.3	9	22.0	20	29.0
	Alive until 7 th day of life	2	7.1	2	4.9	4	5.8
Lethal Congenital Anomaly	YES	2	2.5	3	.9	5	1.3
	No	77	97.5	313	99.1	390	98.7
Over all outcomes (Still birth, ENND)	Bad /adverse	16	20.3	26	8.2	42	10.6
	Favorable	63	79.7	290	91.8	353	89.4

Neonatal outcomes and placenta previa

This analysis examines neonatal outcomes associated with placenta previa. After adjusting for maternal age, parity, and confounders, NICU admission was found to be significantly associated with placenta previa, with babies born to mothers with placenta previa having almost an 11-fold increased risk of NICU admission (AOR: 10.95,

95% CI: 1.37, 87.34). However, while bad perinatal outcomes, unfavorable APGAR scores at the 5th minute, prematurity and its complications, premature birth, and low birth weight were significantly higher in cases, they were not statistically significantly associated with placenta previa (Table5).

Table 5 : Binary and multivariate logistic regression for neonatal outcomes associated with placenta previa among deliveries conducted at Jimma Medical Center, southwestern Ethiopia, November 2020 to September 2021

Neonatal outcomes		Cases N:79	Controls N:316	P Value COR (95%CI)	P Value AOR (95%CI)
NICU Admission	Yes	28	39	3.97 (2.32, 7.07)	10.95 (1.37, 87.34)*
	No	51	277	1	
Bad perinatal outcome	Yes	16	26	2.83 (1.44, 5.59)	9.59 (0.89, 82.66)
	No	63	290	1	
5 th Min unfavorable APGAR score	Yes	9	1	40.64 (5.06, 326.29)	2.56 (0.06, 112.17)
	No	70	315	1	
Prematurity and its Complications	Yes	23	8	15.81 (6.74, 37.12)	9.55 (0.88, 103.44)
	No	56	308	1	
Premature Birth	Yes	38	30	0.10 (0.06, 0.18)	0.68 (0.01, 95.29)
	No	41	186	1	
Low Birth Weight	Yes	38	60	6.78 (3.89, 11.83)	12.15 (0.06, 2525.96)
	No	41	256	1	

COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio , *Statistically Significant variables at $P < 0.05$,

Maternal outcomes of Cases and Controls

The table presents a comparative analysis of preexisting conditions, complications, and outcomes between 79 cases and 316 controls. Notably, 24.1% of cases had preexisting or chronic medical problems, significantly higher than the 7.6% observed in controls. Additionally, 55.7% of cases had risks identified during Antenatal/Intranatal/Postnatal, compared to 44.9% of controls. Postpartum complications were significantly more common in cases, with 69.6% experiencing issues

versus just 22.2% in controls. Among the cases with postpartum complications, 92.6% reported anemia, a stark contrast to the 54.2% in controls, while 73.4% of cases experienced postpartum hemorrhage compared to 19.9% of controls. At presentation, severe anemia was found in 29.6% of cases versus 6.8% of controls, and 75.6% of cases received blood transfusions compared to only 8.2% of controls. Hospital stay durations also differed significantly; only 23% of cases were discharged in less than four days, while 87% of controls (Table 6)

Table 6: Maternal outcomes in Cases and Controls among deliveries conducted at Jimma Medical Center, southwestern Ethiopia, November 2020 to September 2021

Variable and Categories		Cases N= 79		Controls, N=316		Total, N=395	
		F	%	F	%	F	%
Preexisting Or chronic medical problem	Yes	19	24.1	24	7.6	43	10.9
	No	60	17	292	83	352	89.1
Antenatal/Intranatal/ Postnatal risks identified	Yes	44	55.7	142	44.9	186	47.1
	No	35	44.3	174	55.1	209	52.9
Postpartum period complications	Yes	55	69.6	70	22.2	125	31.6
	No	24	30.4	246	77.8	270	68.4
Types of PP complications(n=125)	Anemia	51	92.6	38	54.2	89	71.2
	Others	3	5.4	32	45.8	36	28.8
Postpartum hemorrhage (PPH)	Yes	58	73.4	63	19.9	121	30.6
	No	21	26.6	253	80.1	274	69.4
Anemia at Presentation	Severe Anemia	16	29.6	3	6.8	19	19.4
	Moderate Anemia	7	13	5	11.4	12	12.2
	Mild Anemia	31	57.7	34	77.2	65	68.4
Had blood transfusion	Yes	59	75.6	26	8.2	85	21.6
	No	19	24.4	290	91.8	309	78.4
Hospital Stay	< 4 Days	14	23	260	87	274	69.3
	≥ 4 Days	65	77	56	13	121	30.7
Complications	Yes	21	26.6	26	26.4	47	26.4
	No	58	73.4	73	73.7	131	73.6
Types of complications (n=47)	Cxns of Anesthesia	11	13.9	8	2.5	19	10.7
	Complications of Surgery	10	12.7	18	5.7	28	15.7
Status of the mother on discharge	Improved	79	100	310	98.1	389	98.5
	Discharged with sequelae	-	-	3	0.9	3	0.8
	Maternal death	-	-	3	0.9	3	0.8

Maternal outcomes and placenta previa

The table 7 analyzes maternal outcomes among 79 cases and 316 controls, revealing significant differences in various health factors. Notably, 52 cases (65.8%) presented with hemoglobin levels below 11 mg/dL compared to 40 controls (12.7%). Patients with placenta previa had an eightfold risk of being anemic at presentation, with hemoglobin levels below 11 mg/dL (AOR: 8.22, 95% CI: 2.17, 31.05). Patients with placenta previa were also

about six times more likely to be operated on under general anesthesia (AOR: 6.27, 95% CI: 1.74, 22.57). Furthermore, patients with placenta previa had a 15.7 times higher risk of requiring blood transfusions compared to their counterparts (AOR: 15.70, 95% CI: 4.28, 57.53). Pregnant mothers with placenta previa had a 16 times increased probability of having a prolonged hospital stay of more than four days compared to their counterparts (AOR: 16.62, 95% CI: 6.78, 40.75)(Table 7)

Table 7 : Binary and Multivariate Logistic Regression for Maternal outcomes associated with placenta previa among deliveries conducted at Jimma Medical Center, southwestern Ethiopia, November 2020 to September 2021

Maternal Complications		Cases N:79	Controls N:316	COR (95%CI)	AOR (95%CI)
Hg at presentation less than 11mg/dl	Yes	52	40	13.29(7.51, 23.52)	8.22 (2.17, 31.05)*
	No	27	276	1	
Operated under general anesthesia	Yes	44	13	8.32 (3.99,17.31)	6.27 (1.74, 22.57)*
	No	35	303	1	
Anesthesia Complications	Yes	11	8	6.23 (2.41, 16.07)	3.05 (0.14, 68.42)
	No	68	91	1	
Op cxns Including Anemia, Puerperal Sepsis and Wound infection	Yes	55	70	8.05 (4.65, 13.93)	2.38(0.18, 31.02)
	No	24	246	1	
PPH	Yes	58	63	0.09 (0.05, 0.16)	3.04 (0.29, 30.89)
	No	21	253	1	
Had blood transfusions	Yes	59	26	34.64(18.01, 6.64)	15.70 (4.28, 57.53)**
	No	20	290	1	
Duration of Hospital Stay more than 4 days	Yes	65	48	21.56(11.30, 41.11)	16.62 (6.78,40.75)**
	No	14	268	1	

COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio , *Statistically Significant variables at $P<0.05$, **Statistically Significant variables at $P<0.001$

DISCUSSION

This study investigated the association between various risk factors and adverse maternal and neonatal outcomes related to placenta previa. The observed magnitude of placenta previa was 1.48% (15 cases per 1,000 deliveries), with the majority being true placenta previa, accounting for 61 cases (77.2%). This result is slightly higher than the magnitude reported in the same hospital in 2015, which was 1.36%³, and higher than the study conducted at Addis Ababa University, which reported 0.7%¹. It also exceeds the pooled global and Sub-Saharan Africa prevalence rates, which were 0.52% and 0.27%, respectively²⁴.

This higher prevalence, compared to global and Sub-Saharan Africa figures, may be explained by the study design; this was a hospital-based study, whereas other estimates were based on reviews that may not accurately reflect true population prevalence. The increase compared to the study done in Addis Ababa could be attributed to the higher fertility rate in the catchment population of JMC, which is nearly three times greater (5.4 in Oromia versus 1.8 in Addis Ababa)²⁵. The increase compared to the previous study conducted at the same hospital seven years ago may also reflect a proportional rise in known risk factors for placenta previa, such as cesarean delivery and abortion rates²⁶.

The study found that 20.3% of cases experienced adverse outcomes compared to 8.2% in the control group, indicating a 2.5-fold higher risk of poor perinatal outcomes among cases. Specifically, the perinatal death rate was 202 per 1,000 live births in the cases group, compared to 82 per 1,000 live births in the control group. This figure is lower than perinatal mortality rates reported at Jimma Medical Center and Hawassa University Hospital, which were 309 and 447 per 1,000 live births, respectively^{3,27}. The decrease in perinatal deaths may be attributed to the expansion of maternal health services, improved attention to maternal and child health, and strengthened neonatal care nationwide²⁵.

Both maternal age and parity were controlled, and other factors were examined for their association with placenta previa. The study found that patients with a previous history of spontaneous incomplete abortion had an eleven-fold higher risk of developing placenta previa than their counterparts. This finding aligns with a study conducted in Croatia, which showed a significantly higher proportion of previous abortions among women with placenta previa¹³. Similarly, a meta-analysis from Iran reported that previous spontaneous abortions increase the odds of placenta previa²⁸. This may be explained by the increasing number of women seeking safe induced abortions and post-abortion care in Ethiopia²⁹, as well as possible endometrial damage during repeated abortions and uterine procedures, which can hinder normal fundal implantation of the placenta and lead to placenta previa^{13,30}.

The study also found that a significant number of women (20.3%) had a previous cesarean delivery, another recognized risk factor for placenta previa. However, when adjusted for confounders, this association was not statistically significant. This finding contrasts with the study conducted at Addis Ababa University, which showed a threefold increased risk¹, and with meta-analysis findings showing that previous cesarean delivery increases the odds of placenta previa¹⁶. The difference may be explained by the study design, small sample size, and study population. The current hospital-based study includes many high-risk mothers, such as those with previous cesarean scars, which may also be represented in the control group. This could reduce the observed difference compared to population-based studies³¹.

The current study found that the need for blood transfusion, prolonged hospital stay, operations under general anesthesia, and anemia with hemoglobin levels below 11g/dL were major maternal complications associated with placenta previa. Patients with placenta previa were more likely to require blood transfusions than their counterparts. This finding is consistent with the study conducted at Addis Ababa University, which

reported a threefold increased risk¹, and higher than the study conducted at Columbia University, which also found increased odds of transfusion³². The higher risk of blood transfusion may be attributed to delayed presentation among patients in this study, with a mean time of 6.32 hours from onset of bleeding to hospital arrival. Additionally, most cases originated from rural areas, with a mean distance of 67.2 km from their hometowns to JMC. Another factor significantly associated with placenta previa was the need for operations under general anesthesia. This finding is consistent with a study from Saudi Arabia, which showed that antepartum hemorrhage due to placenta previa increased the likelihood of operations performed under general anesthesia³³. The preference for general over regional anesthesia by both anesthetists and surgical teams may result from the late presentation of most patients in this study. Many presented after significant bleeding had begun, leading to low hematocrit levels and unstable vital signs. Furthermore, the urgency of surgery in placenta previa cases—where only 27.8% were operated on electively—likely contributed to the increased use of general anesthesia.

In contrast to previous studies, this study found no significant association between postpartum hemorrhage and placenta previa. This could be due to the higher risk of morbidly adherent placenta and cesarean hysterectomy, as well as bleeding from the placental bed when the lower uterine segment fails to contract effectively.

The study showed that anemia at presentation with placenta previa, defined as hemoglobin levels below 11 g/dL, was 8.2 times higher among cases than among controls. This finding aligns with the Addis Ababa University study, which reported that patients with placenta previa were fourteen times more likely to present with anemia than their counterparts¹.

The study also assessed the association between neonatal outcomes and placenta previa. It found that neonates born to mothers with placenta previa had about an eleven-fold increased likelihood of

NICU admission. A study conducted in Egypt reported a 22.06% increased risk of NICU admission associated with placenta previa³⁴.

Overall, these findings have important implications for maternal health policymakers, healthcare providers, mothers, and researchers. Interventions should target modifiable factors influencing birth outcomes. Despite its strengths, the relatively small sample size limits the interpretation and generalizability of the findings.

Conclusion and Recommendations

This study demonstrated that the incidence of placenta previa is approximately 15 cases per 1,000 deliveries. A significant risk factor for placenta previa was a previous history of spontaneous incomplete abortion. Associated maternal and neonatal outcomes included the need for blood transfusion, anemia with hemoglobin levels below 11 g/dL at presentation, prolonged hospital stay before delivery, exposure to general anesthesia during delivery, and an increased risk of NICU admission. Further follow-up studies are recommended to better understand the prevalence and risk factors for placenta previa, including assessments in both general and primary hospitals.

Declarations

Ethics approval and consent to participate: The manuscript adhered to ethical standards. Ethical approval was obtained from the IRB of the Institute of Health, Jimma University. Informed consent was obtained from each respondent before data collection, and participation in the study was entirely voluntary.

Availability of data and materials: Data are available from the corresponding author upon reasonable request.

Competing interests: The authors declare no competing interests.

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Authors' contributions: AG developed the protocol, methodology, and formal analysis. AG and SB prepared the manuscript. All authors reviewed and commented on the methods and analysis and approved the final version of the manuscript.

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Operational Definitions

- Maternal outcome: Considered adverse if the pregnant mother experiences any complication, including death.
- Perinatal outcome: Considered adverse if the newborn experiences stillbirth and/or early neonatal death (ENND).
- Birth outcome: Refers to the outcome of birth, including maternal and perinatal outcomes. It is considered adverse if either the neonatal or maternal outcome is complicated.

List of abbreviations

AOR : Adjusted Odds Ratio,
COR: Crude Odds Ratio,
ENND : Early neonatal death ,
GA: Gestetional Age ,
JMC: Jimma Medical Center ,
LBW : Low Birth Weight ,
NICU :Neonatal Intensive Care Unit ,
PPH : Postpartum hemorrhage,
TVET: Techinal and Vocational Training.

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