INCIDENCE, CONTRBUTING FACTORS AND BIRTH OUTCOMES OF PLACENTA PREVIA AMONG MOTHERS DELIVERED IN JIMMA MEDICAL CENTER SOUTH WEST ETHIOPIA, A MATCHED CASE CONTROL STUDY

BY: ATSINAGN GIRMA (MD, OBSTETRICS AND GYNECOLOGY RESIDENT)

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JIMMA, ETHIOPIA

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Abstract

Background: - Placenta previa is abnormally placed placenta in the lower uterine segment, or when it covers the cervix totally. It Complicates 3-5 per 1000 pregnancies worldwide. It is raising because of increasing cesarean section rates. It is associated with severe maternal and neonatal morbidity and mortality.

Objective: - The main objective of this study was to assess incidence, contributing factors and birth outcomes of placenta previa among mothers delivered in Jimma Medical Center from November 2020 to September, 2021.

Methodology:- A facility based observational matched case-control study design was employed, Controls are Matched with Cases with Age and Parity. Data was cleaned, coded, and entered into SPSS version 26.0 statistical software. Descriptive statistics was used to summarize categorical variables. Bi-variable and Multivariable Logistic Regression was employed to identify Association between Dependent and Independent variables. Adjusted Odds ratio (AOR) with 95% confidence intervals and P value < 0.05 was considered statically significant. The results were compiled and presented in tables and graphs.

Results: - The magnitude of Placenta Previa Observed was 15 in 1000 deliveries. Previous history of Spontaneous Incomplete Abortion [AOR 11.063; 95% CI: 1.41, 86.816] is significantly identified risk factor. A need for Blood Transfusion [AOR: 15.699; 95%CI, 4.284, 57.528] , Operation under General Anesthesia [AOR 6.268, 1.741, 22.569] , Hospital stay more than 4 days [AOR: 1.019 95%CI 1.007, 1.030] and Anemia with Hg < 11 g/dl [AOR; 8.215 95% CI 2.173, 31.054] are significantly identified maternal complications and Admission to NICU of newborns of placenta previa [AOR; 10.952 95%CI 1.374, 87.315] is significantly identified neonatal complication with P < 0.05.

Conclusions: Previous History of Spontaneous Incomplete Abortion is significantly associated risk factors of Placenta Previa. Maternal Complications associated with Placenta Previa are a Need for Blood Transfusion, Anemia with Hg < 11 g/dl , Exposure to General Anesthesia and Prolonged Stay at Hospital Before Delivery. Neonatal complication of Placenta Previa found was increased risk of Admission to NICU.

Key words :- Placenta previa, Maternal Complications, Neonatal Complications

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ACRONYMS AND ABREVATIONS

ANC	Ante Natal Care
AOR	Adjusted odds ratio
COR	Crude Odds Ratio
CI	Confidence Interval
CS	Caesarean Section
D&C	Dilatation and Curettage
ENND	Early Neonatal Death
GA	Gestational Age
ICU	Intensive Care Unit
IUFD	Intrauterine Fetal Death
IUGR	Intrauterine Growth Restriction
IVF	In vitro Fertilization
JMC	Jimma Medical Center
LBW	Low Birth Weight
MMR	Maternal Mortality Ratio
NICU	Neonatal Intensive Care Unit
PP	Placenta Previa
PPA	Placenta Previa Accreta
PPH	Postpartum Hemorrhage
SPSS	Statistical Package for Social Sciences
TAS	Transabdominal sonography
TVS	Transvaginal sonography
WHO	World Health Organizatio

Chapter One: Introduction

1.1. Background Information

Placenta praevia is a disorder that happens during pregnancy when the placenta is abnormally placed in the lower uterine segment, which at times covers the cervix. Placenta Previa is one of the main causes of Antepartum Hemorrhage which is still presents as one of the most dreaded and devastating group of disorders In Obstetrics. Vaginal Bleeding occurring in third Trimester causes are mainly Placenta Previa , Placenta Abruption and Marginal Separation of Placenta. The incidence of placenta previa is 3-5 per 1000 pregnancies worldwide and is still rising because of increasing cesarean section rates. The incidence is much higher at mid pregnancy than at 36 weeks of GA and above, because of formation of the lower segment of the uterus and possibly due to tropho-tropism resulting in resolution of placenta praevia.(1)

Bleeding often occurs as the lower part of the uterus begins to stretch and lengthen in preparation for delivery, When the cervix begins to efface and dilate, the attachment of the placenta to the uterine wall is detached, resulting in bleeding.(2) Recently, PP has been consolidated in two definitions: True Placenta Preva and Low Lying Placenta. A True Placenta Preva is defined as a complete coverage of Cervical Os by the placenta. If the leading edge of the placenta is less than 2 cm from the internal Os, but not fully covering it is considered as Low Lying Placenta.(3)

Advanced maternal age, parity, maternal smoking, infertility treatments, previous cesarean deliveries, previous placenta previa, and recurrent abortions are risk factors associated with placenta previa. Among the aforementioned risk factors , several of them have increased during the past decade including the rate of Caesarean section , advanced maternal age and the number of women undergoing

infertility treatments.(4) Neonates born to mothers with placenta previa are more likely suffer from preterm birth, perinatal death, congenital malformations, and low APGAR score at 1st and 5th minute (<7).(5–10) majority of babies also require resuscitation and NICU admission.(8) Moreover, the most substantial outcome of this disorder is small for gestational age and low birth weight.(10,11) The complications of placenta previa is limited not only to the antepartum period but also to the intrapartum and postpartum courses including a high rate of cesarean delivery, per partum hysterectomy, morbidly adherence of placenta, and postpartum hemorrhage.(3,12–14) Previous studies have estimated the rate of hysterectomy among women with placenta previa to be 5%. Pregnancies complicated with placenta praevia have also a significantly higher rate of postpartum anemia and delayed discharge from hospital.(3,7)

1.2. Statement of the problem

Placenta Previa presenting as Antepartum Hemorrhage in third Trimester is one of the gravest obstetric emergencies. Even with the best Obstetric care, due to the dramatic suddenness, a pregnant woman can extinguish due to severe bleeding. Severe bleeding in Placenta Previa is associated with severe maternal morbidity and sometimes mortality. This is especially high in developing countries were few women attend ante natal care, there is shortage of blood for transfusions and Operative delay due to logistic problems .The risk factors for severe bleeding in parturient with placenta Previa are not well documented.(1) Studies have shown that placenta previa also carries greater risks of surgical complications including Cesarean Hysterectomy and massive hemorrhage requiring blood transfusion.(3) Neonates born to mothers with placenta previa are at greatest risk of premature birth , low APGAR score and increased admission to NICU.(9) Therefore, the purpose of the current study is to determine the magnitude, risk factors, and Neonatal and maternal outcome of pregnancies complicated by Placenta Previa.

1.3. Significance of the study

The purpose of the study is to determine the magnitude, risk factors, and neonatal and maternal outcomes of pregnancies complicated with placenta previa. This study will be helpfull in the development of updated standard management guideline for the management of placenta previa in Jimma Medical Center. In addition This study will have the following significance's

- ✧ It will provide a better understanding regarding the risk factors and maternal and neonatal complications of placenta previa in the context of Ethiopia, specifically south west of Ethiopia.
- ✧ Since there is no research on specific topic in the study area , the results of the study will help on understanding of the incidence , contributing factors and neonatal and maternal outcomes of pregnancies complicated by placenta previa.
- ✧ These research findings will be used as a baseline for further studies on placenta previa and related topics on the study area.

Chapter Two: Literature Review

2.1. Placenta Praevia

Placenta previa comes from the Latin word , previa means going before and in this sense, the placenta goes before the fetus into the birth canal. In obstetrics, placenta previa describes a placenta that is implanted somewhere in the lower uterine segment, either over or very near the internal cervical os. Traditionally, four variations of placenta previa were recognized , with this Placenta Preavia is the most common one with 74.9% incidence. (15) Complete: Total coverage of the internal cervical os by placental tissue**,** Partial: placental edge partially covering the internal cervical os , Marginal : placental edge at the margin of the internal cervical os and Low lying. : Placental edge within 2 cm of the interval cervical os. This classification is often subtle and varied by the timing and method of diagnosis. The current classification of Placenta previa only incorporates the True Placenta Previa and The Low Lying Placenta, which means as the lower edge of the placenta is within 20mm of from but not over the internal os. The classification of some cases of previa will depend on cervical dilation at the time of assessment.(16) For example, a low-lying placenta at 2-cm dilation may become a partial placenta previa at 4-cm dilation because the cervix has opened to expose the placental edge. Conversely, a placenta previa that appears to be total before cervical dilation may become partial at 4-cm dilation because the cervical opening now extends beyond the edge of the placenta. The overall reported incidence of placenta previa at delivery is 1 in 200 births. In the second trimester, placenta previa may occur in up to 6% of pregnancies. The term placental migration has been used to explain this "resolution" of placenta previa that is noted near term.(17) the overall incidence of placenta previa at Term is in the range of 3 to 6 per 1000 pregnancies.(18)

2.2. Risk factors for development of Placenta previa

a) **Maternal Age**: Advancing maternal age increases the risk of placenta previa . as indicated in researches, prevalence of placenta previa is about 1% between age 12-19, 0.33% between the age 20-29 and 1 % between age 30-39 and 2% if the woman's age is greater than 40.(17) placenta previa risk increased in multi parous and advanced age mothers thought to be due to atherosclerotic changes in uterus resulting in under-perfusion and infarction of the placenta. There by increasing the size of the placenta.(1)

b) **Multiparity** : Studies have reported more cases of placenta previa with increasing parity. Grand multiparas have been reported to have a 5% risk for placenta previa compared with 0.2% among nulliparous women. The inter pregnancy interval does not affect this rate.(5,18,19)

c) **Previous Caesarean section:** women with one or more prior cesarean deliveries are at greater risk for subsequent placental disorders that includes placenta previa, abruption, or morbidly adherent placent.(20) Surgical disruption of the uterine cavity, which causes lasting damage to myometrium and endometrium, is a potential risk factor for placenta previa. If previous cesarean section is performed there will be a problem of angiogenesis in the previous operation site that may cause partial hypoxia. This hypoxia leads to incomplete decidualization and abnormal trophoblastic invasion that can cause placental adhesion. Study done in Tikur Anbessa and Ghandi Hospital, Addis Ababa, Ethiopia shows About 26.1 % of cases with placenta previa had past history of Cesarean section compared with controls which was 8.9%.(15). In the pregnancy following a cesarean delivery, the risk for placenta previa has been reported to range from 1% to 4%. A linear increase is seen in placenta previa risk with the number of prior cesarean deliveries. Placenta previa occurs in 0.9% of women with one prior cesarean delivery, in 1.7% of women with two prior cesarean deliveries, and in 3% of those with three or more cesarean deliveries. In patients with four or more cesarean deliveries, the risk for placenta previa has been reported to

be as high as 10%.(21) in meta-analysis of 170640 pregnant woman, a dose related response pattern of risk factors for placenta previa was found with increasing number of cesarean section deliveries. the odds ratio ranged from 4.5 for one ceserean section delivery to 44.9 for Four and more cesarean section deliveries.(6) Importantly, women with a prior uterine incision and placenta previa have an elevated likelihood that cesarean hysterectomy will be necessary because of an associated morbidly adherent placenta. In one study, 6 percent of women with a primary cesarean delivery for previa required a hysterectomy. This rate was 25 percent for women with a previa undergoing repeat cesarean delivery

d) **Dilatation and Curettage:** is also an additional risk factor. refers to surgical removal of part of the lining of the uterus or contents of the uterus by scraping and scooping (curettage).(6) based on retrospective study carried out at tertiary referral center in north India , among 70 women who had placenta previa , 39.47% of the sample population had history of dilatation and curettage.(9) with liberalization of abortion practices and easy accessibility , the incidence of pregnancy related evacuation and curettage has increased , thereby , increased incidence of placenta previa.(5)

e) **Prior Placenta Praevia** : Having a prior placenta previa increases the risk for the development of another previa in a subsequent pregnancy. This association has been reported to be as high as an eight fold relative risk.(19)

f) **IVF/ICSI** : this association may be derived from overlapping effects. For example, older women comprise a significant portion of ART patients . In addition, multifetal gestation is a well-known risk of both in vitro fertilization and previa. However, even adjusting for these overlapping elements, ART is still associated with higher previa rates, due to mechanical placement of embryos causes ,the release of prostaglandin which may lead to uterine contractility.(22) This

could be the possible explanation for the occurrence of implantation in the lower uterine cavity and thus resulting development of placenta previa.

g) **Smoking:** Cigarette smoking has been associated with as high as a threefold increased risk for previa formation. Likewise, a case control study has demonstrated that maternal cocaine use increases the risk of placenta previa fourfold. It is theorized that carbon monoxide hypoxemia causes compensatory placental hypertrophy that related to defective decidua vascularization.(23) Another Meta-Analysis study in 2016 also showed that smoking is a key risk factor for placenta previa.(24)

h) **Endometriosis:** it has been observed to alter the characteristics of endometrium. It affects expression of various factors and markers receptivity during the implantation window.(25) Following ovulation, progesterone plays an important role in mediating the changes in the endometrium during the secretory phase. There has been emerging evidence that suggests endometriosis results in progesterone resistance hence affecting the placentation.(25)

i) **Previous history of Abortion:** the role of previous abortion either spontaneous or induce , proved to be important for placenta previa development in our population of pregnant woman. Study done in Tikur Anbessa and Ghandi Hospital, Adis Abeba, Ethiopia shows 31 % of patients with PP had previous history of abortion and 4% of them had previous history of molar pregnancy.(15) The percentage of previous abortion is significantly higher among women with placenta previa which increases the risk by 2.75 .The risk increased with increasing number of previous abortions. The mechanism how previous abortion predispose to placenta previa development could be explained with possible endometrial damage during repeated abortions, which impedes successful fundal implantation of placenta.(5)

2.3. Clinical findings

Placenta previa typically presents as painless vaginal bleeding in the late second or third trimester. However uterine pain and/or contraction don't exclude the diagnosis in women with vaginal bleeding. The bleeding is believed to occur from disruption of placental blood vessels in association with the development and thinning out of the lower uterine segment. Bleeding from a previa usually begins without warning and without pain or contractions in a woman who has had an uneventful prenatal course. This is called a sentinel bleeding and Usually it ceases, only to recurring in some women ; particularly those with a placenta implanted near but not over the cervical os. It can also be provoked by digital examination or sexual intercourse.(26) However, 10 percent of women, particularly those with a placenta implanted near but not over the cervical os, there is no bleeding until labor onset. Between 70% and 80% of patients with placenta previa will have at least one bleeding episode. About 10% to 20% of patients present with uterine contractions before bleeding, and fewer than 10% remain asymptomatic until term. Of those with bleeding, one third of women will present before 30 weeks of gestation, one third between 30 and 36 weeks, and one third after 36 weeks. Early-onset bleeding (<30 weeks) carries with it the greatest risk for blood transfusion and associated perinatal morbidity and mortality. A specific sequence of events leads to bleeding in cases in which the placenta is located over the internal os. First, the uterine body remodels to form the lower uterine segment. With this, the internal os dilates, and some of the implanted placenta inevitably separates. Bleeding that ensues is augmented by the inherent inability of myometrium fibers in the lower uterine segment to contract and thereby constrict torn vessels. Hemorrhage from placental implantation site in the lower uterine segment may continue after delivery of the placenta, because the lower uterine

segment contracts poorly compared with the uterine body. Placenta previa may be associated with placenta accreta or one of its more advanced forms , Placenta increta or percreta .(27) This abnormally firm placental attachment derives in part from poorly developed decidua that lines the lower uterine segment. Biswas and coworkers (1999) performed placental bed biopsies in 50 women with a previa and in 50 control women. Trophoblastic giant-cell infiltration of spiral arterioles rather than endovascular trophoblastic cells was found in half of previa specimens. In contrast, only 20 percent of biopsies from normally implanted placentas had these changes.(25).

2.4. Diagnosis of Placenta Previa

Diagnosis is determined by ultrasonic imaging technique. Trans abdominal (TAS) ultrasound scan is the conventional method but recently Trans vaginal ultrasound (TVS) scan and Trans labial scan are found to be more accurate and reliable. Although TAS ultrasound can detect at least 95% of placenta previa cases, TVS has reported diagnostic accuracy that approaches 100%. Typically, a combined approach can be used in which TAS is the initial diagnostic modality, followed by TVS for uncertain cases. TVS compared to TAS is more reliable, does not need filling of bladder and has special advantage with posterior situated placenta. In the situation of TAS, the ultrasound waves may be rejected back to the calvarum and may be difficult to delineate the lower edge of the placenta. TVS makes visualization of posterior low lying placenta easy and the relation of placental edge to the internal os can be determined accurately. Additional benefit is reduced scanning time in TVS.(28) If a placenta previa or low-lying placenta is diagnosed in the second trimester, repeat sonograph should be obtained in the early third trimester at 32 weeks. At 32 weeks' gestation, if the placental edge is still <2 cm from the os, then TVS is repeated at 36 weeks. More than 90% of the cases of placenta previa diagnosed

in the second trimester can resolve by term. The potential for placenta previa resolution is dependent on the timing of the diagnosis, extension over the cervical os, and placental location. Complete placenta previa diagnosed in the second trimester will persist into the third trimester in 26% of cases, whereas a low-lying placenta will persist in only 2.5% of cases. Finally, anterior placenta previa is less likely to migrate away from the cervical os than posterior placement. Using MRI imaging, several investigators have reported excellent results in visualizing placental abnormalities. That said, it is unlikely that this technique will replace sonography for routine evaluation anytime soon. However, MR imaging has proved useful for evaluation of morbidly adherent placenta.(29)

2.5. Management of Placenta Previa

Once diagnosis of placenta previa is established , management decision depends on the Gestational Age of the fetus and extent of the vaginal bleeding. with a preterm pregnancy the goal is to attempt to obtain fetal maturation without compromising the mothers health.(30) General management principles for patients with placenta previa in the third trimester include serial ultrasounds to assess placental location and fetal growth, avoidance of cervical examinations and intercourse, activity restrictions, counseling regarding labor symptoms and vaginal bleeding, dietary and nutrient supplementation to avoid maternal anemia, and early medical attention if any vaginal bleeding occurs. Asymptomatic women with placenta previa may be managed expectantly as outpatients. Candidates for outpatient management must be compliant, live within a short distance from the hospital (20 minutes), have 24-hour emergency transportation to the hospital, and verbalize a thorough understanding of the risks associated with placenta previa. Women with placenta previa who present with acute vaginal bleeding

require hospitalization and immediate evaluation to assess maternal-fetal stability. They should initially be managed in a labor and delivery unit with hemodynamic surveillance of the mother and continuous FHR monitoring. Large-bore IV access and baseline laboratory studies. If the pregnancy is less than 34 weeks of gestation, administration of antenatal corticosteroids should be undertaken, tocolysis may be used if the vaginal bleeding is preceded by or associated with uterine contractions. Once stabilized, most women with symptomatic placenta previa can be maintained on hospitalized bed rest and expectantly managed. Although maternal hemorrhage is of the utmost concern, fetal blood can also be lost during the process of placental separation with a bleeding placenta previa. Anti D immune globulin should be given to all Rh-negative un sensitized women with third-trimester bleeding from placenta previa.(38,39). Cesarean delivery is indicated for all women with sonographic evidence of placenta previa and most women with low-lying placenta. Cesarean delivery of asymptomatic placenta previa should occur between 36 0/7 and 37 0/7 weeks of gestation. When the bleeding episode is not profuse or repetitive, the patient is managed expectantly in the hospital on bed rest. With expectant management 70% of patients will have recurrent vaginal bleeding prior to completion of 36 weeks gestation and will require delivery.(30) In cases of complicated placenta previa, delivery should occur immediately regardless of gestational age. Complicated placenta previa includes bleeding associated with a non-reassuring fetal heart pattern despite resuscitative measures, life-threatening maternal hemorrhage, and/or refractory labor. When performing a cesarean delivery for placenta previa, the surgeon should be aware of the potential for rapid blood loss during the delivery process. Blood products that are cross matched should be readily available for delivery. In addition, before incising the lower uterine segment, the surgeon should assess the vascularity of the region. Although a low transverse incision is not contraindicated in patients with placenta

previa, performing a vertical uterine incision may be preferable in some cases. This is particularly true with an anterior placenta previa. Ideally, the placenta should not be disrupted when entering the uterus. If disruption occurs, expedited delivery is essential. Given the potential for invasive placentation, the physician should allow the placenta to spontaneously deliver. If it does not separate easily, precautions should be taken for placenta accreta management. Because the lower uterine segment often contracts poorly, significant bleeding may occur from the placental implantation site. Aggressive utero tonic therapy, surgical intervention, and/or tamponed techniques should be undertaken to rapidly control bleeding. Finally, some studies have shown reduced bleeding at the placental site with the injection of sub endometrial vasopressin after delivery of the fetus.(31)

2.6. Maternal Complications

a) **Hemorrhage**: massive hemorrhage either antepartum, intra partum or postpartum associated with placenta previa is a genuine risk and may lead to maternal death. Although a complete placenta previa cases tend to be associated with earlier and more severe bleeding , lesser degree of placenta previa may cause life threatening hemorrhage thus the degree of Placenta is only a factor in the prognosis and management. Study done in Tikur Anbessa and Ghandi Hospital, Adis Abeba, Ethiopia shows women with PP who had developed PPH and adherent placenta after delivery were 22.4% and 6.6 % respectively.(15) Retrospective study conducted in Abha General Hospital, Soud Arabia shows , women with major PP showed significantly higher incidence of antepartum hemorrhage(3.18%).(3) In systematic review and meta-analysis to asses the prevalence of APH in pregnant women with placenta previa that was conducted in 2016, the pooled overall prevalence of APH among pregnant women with placenta previa was 51.6% . in

heterogeneous set of studies.(32) From systematic review and meta - analysis of observational studies, estimating PPH in women with PP was conducted through literature searches in four database in July 2016, among 1148 obtained studies , 11 included in the meta analysis , which involved 5146 unique pregnant women with PP. The overall pooled incidence of PPH is 22.3%. in the subgroup , the prevalence is 27.4% in PP, and was 14.5% in low lying placenta previa ; the highest prevalence is estimated in Northern America is 26.3%. followed by the Asia 20.7%, Australia 19.2% and Europe 17.8.(33)

b) **Placenta Previa Accreta (PPA)**: PPA represents the abnormal attachment of the placenta to the uterine lining due to an absence of the decidua basalis and an incomplete development of the fibrinoid layer. Variations of PPA include placenta increta and placenta percreta, in which the placenta extends to or through the uterine myometrium, respectively. Based on histologic diagnosis, placenta accreta is the most common form of invasive placentation (79%) followed by placenta increta (14%) and placenta percreta (7%), respectively. It should be suspected in all women with PP. 9-10% of cases PP are associated with PPA. The risk for placenta accreta in patients with placenta previa and an unscarred uterus is approximately 3% ,this figure increases as number of previous Caesarean section increase with 11% ,40%, 61% and 67% after 1,2, 3 and ≥4 number of prior Caesarean delivery respectively. In retrospective study conducted in the Gynecology and Obstetrics clinic ,of Sutcu Imam University Hospital the complete PP was determined to increase the risk of Accreta , 8.8,95%. In another retrospective study of 64359 births, placenta accreta prevalence is reported as 1/553 . of the placenta accreta cases in that study, 50 % of cases had history of Caesarean section and 31.5% had placenta praevia.(34) In majority of cases it remains asymptomatic until delivery. Although bleeding prior to labor is common, its associated to PP than Accreta. .Ultrasound is the preferred radiographic modality for

the diagnosis of placenta accreta. With a sensitivity of 90%, a specificity of 97%, a positive likelihood ratio of 11, and a negative likelihood ratio of 0.16(45). Findings suggestive of placenta accreta include a loss of the normal hypo echoic retro placental myometrium zone, thinning and disruption of the uterine serosa– bladder wall interface, focal exophytic masses within the placenta, and numerous intra placental vascular lacunae.(35) Color Doppler ultrasound is also useful as an adjunctive tool in diagnosing placenta accreta. Specific color Doppler findings that differentiate placenta accreta from normal placentation. Includes diffuse and focal intra parenchymal placental lacunar blood flow, hyper vascularity of the bladder and uterine serosa, prominent sub placental venous complexes, and loss of sub placental Doppler vascular signals. Some color-flow mapping studies suggest that a myometrium thickness less than 1 mm with large intra placental venous lakes is highly predictive of invasive placentation (sensitivity, 100%; specificity, 72%; positive predictive value, 72%; and negative predictive value, 100%). Placenta accreta is confirmed by the pathologic examination of a hysterectomy specimen. PPA may present as severe intraoperative bleeding due to difficulty in its removal and may necessitate Caesarean Hysterectomy a lifesaving procedure. Timing of delivery depends upon clinical circumstances; however, most authorities favor delivery at 34 0/7 to 35 6/7 weeks with or without antenatal corticosteroid administration. Especially for a suspected placenta percreta multidisciplinary team approach is recommended. Including maternal-fetal medicine specialists, neonatologists, blood conservation teams, anesthesiologists, advanced pelvic surgeons, and urologists. (26)

c) **Hysterectomy:** selo et al reviewed all emergency Per partum Hysterectomies performed at tertiary hospital in London , and identified the risk factors emergency per partum hysterectomy found to have an incidence of 0.48 per 1000. Woman who had emergency per partum

Hysterectomy were significantly older and multiparous. More of the cases had a history of uterine surgery , placenta previa and were delivered by C/S. hemorrhage due to placenta previa is the main indication for emergency per partum hysterectomy(47%).(36) The indication for emergency per partum Hysterectomy has changed recently from traditional uterine atony to abnormal placentation. Patients with PP and scared uterus had 16% of risk of undergoing emergency per partum hysterectomy compared to 3.6% in patients with un scared uterus.(37)

d) **Blood Transfusion**: The amount of blood transfused is more in women with major PP. This denotes that the increased blood transfusion is due to increased bleeding caused by placenta accreta and hysterectomy and not due to major PP. According to study done in obstetric unit of Abha General Hospital , Saud Arabia , total blood transfusion > 3 units in major PP is 27.2% and in minor PP 10.5% (3). in another prospective study that carried out at Sri Ramachandra Medical Hospital ,porur, chenei, among 163 PP patients 39.65% of them received blood transfusion.(8)

2.6. Neonatal Complications

Study done in Tikur Anbessa and Ghandi Hospital, Addis Ababa, Ethiopia shows 1st and 5th min Apgar score <7 of 23.4% and 2% respectively and 25.7% of them admitted to NICU and from this 14.9 % of them admitted for Respiratory distress syndrome. And 2% of the had major congenital anomaly.(15) According to Danish national cohort study that conducted on neonatal outcome in singleton pregnancies with placenta previa from 2001 to 2006 , neonates born after pregnancies with PP had higher risk of being born at Gestational age below 37 weeks 8.6, Apgar score of < 7 at 5 minutes 2.7, transfer to NICU 4.3, Still birth and Neonatal Mortality 1.8 .(53). In another study, Pregnancies complicated by PP had significantly higher rates of Perinatal

mortality 2.6 , Apgar score of < 7 at 5 minutes 4.4 , delayed infant discharge from hospital 10.9 and IUGR as compared to pregnancies without PP.(7) Neonates born in Early Gestational age (preterm) are due to placenta previa were at risk of respiratory distress syndrome fivefold. The rate of preterm birth in patients with PP in the primary Caesarean section pregnancy was 55.9% and these patients had higher rate of recurrent preterm delivery than the rest of the study population. Among patients with PP in the primary Caesarean section pregnancy, those who delivered preterm had higher rate of recurrent spontaneous preterm birth regardless of the location of their placenta in the subsequent delivery . In comparison to all patients with who had a primary Cesarean section, patients who had placenta previa and delivered preterm had an independent increased risk of recurrent preterm birth , Retrospective study done in Nepal shows that out of 82 cases of Caesarean section done for placenta previa , 45.7% of the babies were preterm and 27% were low birth weight babies and seven babies had neonatal death.(7)

2.7. Conceptual Framework

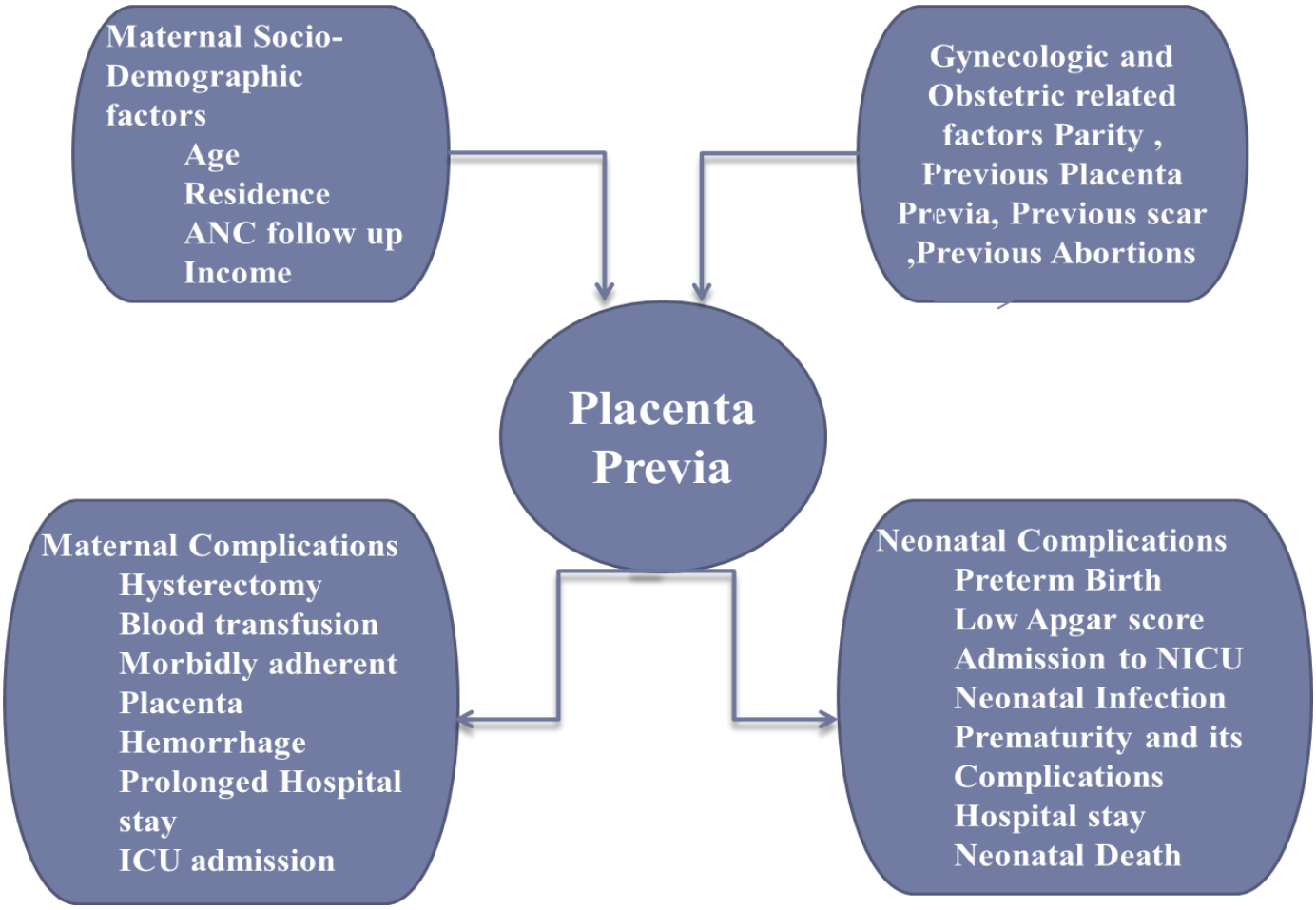

Figure 2: 1 conceptual frame work of maternal and neonatal outcome of deliveries complicated by placenta previa. (38)

Chapter Three: Objectives

3.1.General Objective

- ✓ To assess Incidence, Contributing factors and maternal and perinatal outcomes of Placenta Previa among mothers delivered in Jimma Medical Center, Southwest Ethiopia.

3.2.Specific Objectives

- ✓ To assess magnitude of placenta previa.
- ✓ To identify risk factors associated with Placenta Previa among study populations
- ✓ To assess perinatal outcome of Placenta Previa.
- ✓ To assess maternal outcome of placenta previa

Chapter Four: Methods and Material

4.1. Study Area and Study Period: The study was conducted from November 2020 to September 2021 at JMC which is one of the oldest public hospitals established in 1937 as Jimma hospital, later Jimma University Specialized Hospital [JUSH] and currently named as JMC which is the only teaching and referral hospital in the South Western part of the country. The Hospital is found in Jimma city; the city lies at an altitude of 7546 feet (2300 metres) and found 354km from Addis Ababa. The hospital has different departments those renders comprehensive health services by professionals of different qualification level

4.2. Study design: The study design was Hospital based Prospective Observational Matched Case-Control study**.** Controls were matched with Cases with respect to Age and Parity. Maternal Age is created in to three Groups (Age ≤ 20, 21-34 and ≥ 35 Years of Age) and also Parity is also created in to three Groups (Para1,Para 2 – 4 and Para ≥5) then Four Controls are selected for each Case by Randomly Matching to either of the three Groups of both age and Parity

Table 4: 1 Distribution of age and parity of Cases matched with Controls in 1:4 proportions

Parameter Matched		Cases		Controls		P value
		No	%	No	%	
Age of Mother	≤20	5	6.3	20	6.3	1.000
	21-34	59	74.7	236	74.7	
	≥35	15	19.0	60	19.0	
Parity	1	18	22.8	72	22.8	1.000
	2-4	42	53.2	168	53.2	
	≥5	19	24.1	76	24.1	

4.3. Populations

4.3.1.1. Source of population:

The Source of Populations of this study were all Pregnant Mothers who gave birth at JMC from November 2020 to September 2021.

4.3.1.2. Study population:

The Study Population Were All pregnancies complicated with placenta previa and gave birth at JMC from November 2020 to September 2021. only who are Singleton Pregnancies are taken for Analysis.

4.4. Inclusion and Exclusion criteria

4.4.1.1. Inclusion Criteria

- ✓ **For Cases**: All pregnancies diagnosed with placenta previa by Ultrasound Trans vaginally or Trans abdominally during Third Trimesters of pregnancy , during Labor and Delivery and gave Birth in the time period . But Pregnant Ladies who had Twin Pregnancy are excluded from Analysis.
- ✓ **For Controls**: All singleton pregnancies with no diagnosis of placenta praevia and gave Birth in the time period

4.4.1.2. Exclusion Criteria:

Women with multiple gestation pregnancies are excluded from Cases at Analysis Stage and from Controls at Data Collection stage to avoid over representation of studying high-risk women.

4.5. Sample size and sampling technique

All singleton deliveries with placenta previa that took place at JMC from November 2020 to September 2021 were selected for the study. First, all cases were Interviewed from Patients and Physicians, recorded from patients cards and Maternal and Fetal outcome were followed. The first four Controls

were selected randomly by matching their Age and Parity of them with respective Cases collected at that day or on subsequent days. Collection of data from Cases and Controls was done by different Personnel. The sample size was determined by Sample Size Calculation formula of Case Control studies of Qualitative variable. We used Previous History of Spontaneous Abortion as a Qualitative Variable from Study done at Iran, and the Proportion of 0.223 and 0.085 was used for cases and controls respectively. 90% statistical power was desired. And the proportion of Cases to Controls Desired was 1:4. The formula used is the following.(24)

$$\text{Sample Size}_{\text{Case group}} = \frac{(r+1)}{r} \quad \frac{(P^*)(1 - P^*)(Z_\beta + Z_{\alpha½})^2}{(P_1 - P_2)^2}$$

$$\text{Sample Size}_{\text{Case group}} = \frac{(4+1)}{4} \quad \frac{(0.154)(1 - 0.154)(1.28 + 1.96)^2}{(0.223 - 0.085)^2}$$

$\text{Sample Size}_{\text{Case group}} = 90$

$\text{Sample Size of}_{\text{Control group}} = 4x90 = 360$

r = Ratio of Controls to Cases, We Used 4 for this study

P* = Average Proportion Exposed = (Proportion of Exposed Cases + Proportion of Exposed Controls) Divided by 2.

For this study we used the Proportion of Previous History of Abortion Cases and Controls found in the study done at Iran, was 0.223 and 0.085 respectively. So that makes the P*= 0154.

Z_β = Standard Normal Variate for Power , the Desired Power is 90%. And the value we used was. = 1.28

$Z_{\alpha½}$ = Standard Normal Variate for level of significance($p<0.05$), we used 95% level of significance and the value was = 1.96

$P_1 - P_2$ = Effect size or different in proportion expected based on previous studies. p1 is proportion in cases and p2 is proportion in control.

But because the study was limited for 11 Months only, and the achieved number of cases was 79 (87.7% response rate of the Sample Size) and the study analysis continued with this.

4.6. Study Variables

4.6.1.1. Dependent Variables: Neonatal and Maternal complications of Placenta previa.

4.6.1.2. Independent Variables

- ✓ Socio Demographic factors: Residency, education level, occupation, marital status, place of residence, SES (family income), religion and ethnicity.
- ✓ Obstetric factors : Mode of delivery , place of delivery , duration of labor , fetal heart beat status , Need of Blood Transfusion,
- ✓ Maternal Factors : Previous history of Abortion, Previous History of Cesarean Delivery
- ✓ Fetal Factors: Gestational age, sex, weight and Apgar score of the newborn, NICU admission, condition identified on the newborn and time of death.

4.6.2. Inter Independent Variable

- ✓ Placenta Previa

4.7. Operational Definition and Definition of terms

- **Placenta Previa** : an Obstetric complication associated with implantation of placenta in to lower uterine segment , covering part or the entire cervix
- **Ante partum Hemorrhage**: bleeding into and /or from vaginal canal at any time from the 28 week of GA to the second stage of labor.
- **Postpartum Hemorrhage (PPH)**: defined as a blood loss of 500 ml or more within 24 hours after birth and or Decrement in Hematocrit Level by 10% from Pre Delivery and /or Physician Decision and management for PPH.
- **A Need for Blood Transfusion**: if the Patient was transfused with at least 01 Unit of blood or if the Physician decided to transfuse the patient but failed because of different reasons
- **Anemia** : Corresponds to Hg Level below 11gm/dl
- **Moderate Anemia:** corresponds to a hemoglobin level of 7.0-8.9 g/dl.
- **Severe Anemia**: corresponds to a hemoglobin level of less than 7 g/dl..
- **Premature Birth:** if New borns Gestational age is below 37 weeks as determined by either LNMP, Ultrasound below 24 weeks or Balard Score .
- **Unfavorable APGAR Score :** If the APGAR score of the new born is below 7 at 5 the minute.
- **Prematurity and its Complications** : Diagnosis of a Premature Baby had in the NICU including Hyaline Membrane Disease, Intraventricular Hemorhage , Necrotizing Intercolitis, and Others
- **Low birth weight (LBW)**: defined as a birth weight of less than 2500 g (up to and including 2499 g), as per the World Health Organization.
- **NICU Admission**: if the New Born is Admitted to NICU and had established Diagnosis and Management.

- ✧ **Anesthesia Complications**: Complications Associated with either General Anesthesia or Spinal Anesthesia including either of High Spinal Block, Spinal Shock, Failed Intubation, Difficulty of Intubation, Aspiration Pneumonia, Atelectasis and Anesthetists Decision to Manage Patient as Anesthesia Complications.
- ✧ **Morbidly Adherent Placenta:** Physicians Decision to Manage a Patient as Morbidly Adherent Placenta either with Hysterectomy , or Curettage
- ✧ **Postpartum/Op Complications**: Includes patient's diagnosis after Delivery including Anemia, Puerperal Sepsis and Wound infection or any other new development.
- ✧ **Known or Chronic Medical Illness :** Includes Women who had a known Chronic condition before being Pregnant including Cardiac, Renal, Respiratory DM, Liver Disease, HIV/AIDS…etc.
- ✧ **Maternal outcome :** is bad if the pregnant mother is complicated by death
- ✧ **Perinatal Outcome:** is bad if newborn is complicated by stillbirth and/or ENND
- ✧ **Birth Outcome:** the outcome of birth including maternal and perinatal outcome. It's a Bad outcome if any one of the above neonatal and /or maternal outcomes is bad.

4.8. Data Collection and Technique:

A checklist was designed to collect data about study participant's Socio demographic characteristics, Obstetric and Gynecological history, History of current Pregnancy, Mode of Delivery, and presence of comorbidities, cause of death, antenatal and intra natal risks and presence of Maternal and/or Fetal complications. They also have question about time of death, contributing factors using the 3 delay model and preventability of the death. There is also question about gestational age, sex, weight and Apgar score of the newborn and any condition identified on the newborn. The questionnaire is prepared in English and at the time of interview of the Patient or

family member it was translated to the local language, Amharic and Afaan Oromo, by the data collector. Data was collected in two phases using questionnaire from the case notes of the participants medical records, and from face-to-face interview with the patient or family member or the most senior health professional who participated in the management of the patients.

4.9. Data Quality Control

To assure the data quality, two day training was given for data collectors and Supervisors. In order to avoid selection bias of controls, Data from Cases and Controls were collected by different Personnel's. Data collection instrument was adapted from Maternal and Perinatal Death Surveillance and Response Technical Guideline of Ethiopia and the questionnaire was field tested and approved by Federal Ministry of Health to be used at any hospital or health center in Ethiopia Every day the computed questionnaires were reviewed and checked for completeness and relevance by principal investigator and the necessary feedback was offered to data collectors and Supervisors.(39)

4.10. Data Processing and Analysis

Data was Edited and entered into EPI data version 4.6 then it was exported to SPSS (Version 26) for statistical analysis. Data was cleaned for inconsistencies and missing values. Variables that were missed in more than 10% of total sample were excluded from analysis. Descriptive statistics was used to summarize categorical variables. Both bivariate and multivariable analyses were performed using logistic regression and adjusted odds ratios (AOR) with 95% confidence intervals for risk factors and maternal and neonatal complications associated with placenta previa. P value < 0.05 was considered statistically significant.

4.11. Data Ethical Assurance

The study was reviewed and approved by institutional review board (IRB) of JU, health institute. Written consent was taken from respondents and confidentiality of information collected from each participant was maintained.

4.12. Utilization and Dissemination of Results

The proposal and final result of this study was submitted to department of obstetrics and gynecology, college of health science and the final result from the study will be submitted to the CBE office, JU college of public health and medical science in the form of written report and presented for concerned bodies and finally submitted to peer reviewed journal for publications.

Chapter Five: Results

5.1. Socio Demographic Characteristics of Cases and Controls

The number of Deliveries that took place from November 2020 to September 2021 in Jimma Medical Center was 5460 Deliveries. Deliveries Complicated with Placenta Previa account 81, about 1.48 % of all deliveries. From this two of them were Twin Pregnancy and the Rests were singleton Pregnancy. For Subsequent analysis only singleton Pregnancies were taken for analysis to avoid over representation of studying High risk women. The Mean Age for Case and Control was 28.03 (± 5.104) and 28.27 (± 5.176) Years Respectively. The Mean Length of total Hospital Stay for Cases was 12.35 ± 14.302 days, with a range of 4 to 80 days, which is significantly higher than controls (2.85 ± 2.812) days, with a range of 1 to 24 Days. Most of the women were at age of 25-29 years old, Oromo in Ethnicity, Married, Muslim in Religion, Can't Read and Write, House Wife and Live in Urban Areas.

Table 5:1 Socio Demographic Characteristics of Cases and Controls in Jimma Medical Center from from November 2020 to September 2021

Socio Demographic Characteristics		Cases ,N= 79		Controls, N=316		Total, N=395		P value
		No.	%	No.	%	No.	%	
Age	≤ 20	5	6.3	20	6.3	25	6.3	1.00
	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	284	71.9	0.156
	Amhara	9	11.4	49	15.5	57	14.4	
	Kefa	6	7.6	8	2.5	14	3.5	
	Others	6	7.6	31	9.8	40	10.2	
Marital Status	Single	1	1.3	-	-	1	.3	0.093
	Married	78	98.7	313	99.1	391	99.0	
	Widowed	-	-	3	.9	3	.8	
Religion	Muslim	54	68.4	206	65.2	260	65.8	0.372
	Orthodox	21	26.6	76	24.1	97	24.6	
	Protestant	4	5.1	34	10.8	38	9.6	
LevelOf Education	Can't read and write	35	44.3	95	30.1	130	32.9	0.000
	Can read and write but no formal education	-	-	39	12.3	39	9.9	
	Primary school	28	35.4	73	23.1	101	25.6	
	Secondary school and Preparatory School	7	8.9	28	8.9	35	8.9	
	TVET	4	5.1	50	15.8	54	13.7	
	Degree and Above	5	6.3	31	9.8	36	9.1	
Occupation	Professional	9	11.4	78	24.7	87	22.0	0.082
	Farmer	11	13.9	33	10.4	44	11.1	
	Sales and Service	12	15.2	62	19.6	74	18.7	
	Student	15	19.0	46	14.6	61	15.4	
	House wife	32	40.5	97	30.7	129	32.7	
Residency	Urban	21	26.6	207	65.5	228	57.7	0.000
	Rural	58	73.4	109	34.5	167	42.3	

5.2. Obstetric Characteristics of Cases and Controls

With regard to Parity, Most of the Cases were Multiparous accounting for 61(77.2), from this, Most of the Case were Para 2 to Para 4 accounting for 42(53.2 %) followed by Grand Multiparous 19(24.1%) and 18(22.8%) of cases are Primiparous. from the Primiparous 13 (16.4%) had complicated by Placenta Previa in their first Pregnancy experience, that means they never had either Abortion, Ectopic Pregnancy or Molar Pregnancy . with the Proportion of 1:4 , Controls were also selected. Majority of the Pregnant Women Had ANC follow up accounting for 380(96.2%), With Most of them having Four Visits accounting for 226(59.5%) and half of them have ANC at Health Center accounting 192(50%). The Gestational Age of 6(7.6%) Cases and 14(4.4%) Controls is not Known. The incidence of Preterm Delivery is much higher in the Cases than the Controls Groups [38(48.1%) Vs. 30(9.5%)]. But still the proportion of Deliveries at Term are significant in Cases and Much higher in the Control Groups Accounting for 35(44.3%) and 257(81.3%) of Deliveries respectively.

Table 5:2 Obstetric Characteristics of Cases and Controls in Jimma Medical Center from from November 2020 to September 2021

Antenatal Characteristics		Cases N:79		Controls N:316		Total N:395		P value
		No	%	No	%	No	%	
Parity	I	18	22.8	72	22.8	90	22.8	1.000
	II – IV	42	53.2	168	53.2	210	53.2	
	≥ V	19	24.1	76	24.1	95	24.1	
ANC	YES	76	96.2	304	96.2	380	96.2	1.000
	No	3	3.8	12	3.8	15	3.8	
GA at Delivery	Preterm (28-36.6)	38	48.1	30	9.5	68	17.2	0.000
	Term (37-38.6)	35	44.3	257	81.3	292	73.9	
	Post Term(≥ 42)	-	-	15	4.7	15	3.8	
	Unknown GA	6	7.6	14	4.4	20	5.1	

5.3. Previous History of Cases and Controls

With regard to Previous History of Abortion, Percentage of Cases with Previous History of Abortion is Higher than the Controls with value of [20(25.3%) vs. 58(15.2%)]. The Percentage of Induced and Spontaneous Abortion is Comparable in Both Groups , From this , all of Previous Induced Abortion of the Control Group is a Medical Abortion [17(5.4%)] and didn't require Additional Procedure, But in the Case Group there were both previous history of Medical Abortion and MVA done with [4(5.1%) & 3(3.8%)] respectively. With regard to previous history of Cesarean Section both the Cases and the Control Group have comparable Percentage [10(12.7%) and 33(10.4%)]. There were 2 (2 .5%) cases with History of Previous Cesarean Delivery for Placenta Previa , 1(1.3%) case with a history of Previous molar Pregnancy and there were 8(10.1%) cases with a history of either previous or current Cigarette smoking.

Table 5:3 Previous History of Cases and Controls in Jimma Medical Center from from November 2020 to September 2021

Previous History of Cases and Controls			Cases N:79		Controls N: 316		P value
			No	%	No.	%	
Previous History of Abortion	Induced		13	16.5	14	4.4	0.000
	Spontaneous	Complete	2	2 .5	23	7.3	
		Incomplete	21	26.6	7	2 .2	0.000
		Total	23	29.1	30	9.5	
	Both		1	1.3	1	0.3	
	Total		37	46.9	45	14.2	0.000
Previous Cesarean Delivery	Emergency		14	2 .5	8	2 .5	
	Elective		2	17.7	12	3.8	
	Total		16	20.3	20	6.3	0.000
Previous Placenta Previa			2	2.5	3	0.9	0.001
Previous Molar Pregnancy			1	1.3	2	0.6	0.045
Cigarette Smoking			8	10.1	12	3.8	0.000

5.4. Types of Placenta Previa

Placenta Previa is one of the causes of Ante Partum Hemorrhage. However the Severity of Maternal and Neonatal Complications depends on the type of Placenta Previa. Majority of Cases had True Placenta Previa, Accounting 61(77.2%) and The rest are Low Lying Placentation accounting for 18(22.8%). The Overall Distribution of Placenta Previa Types in shown in the figure below.

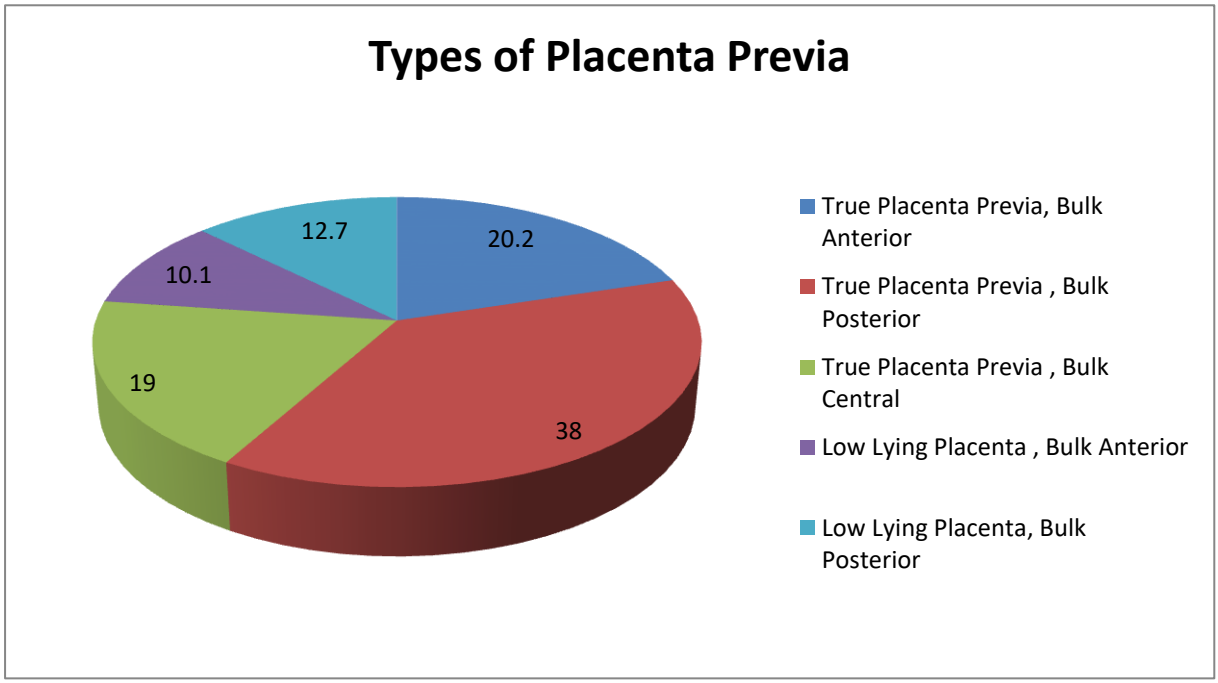

Figure 5 1 Distribution of Types of Placenta Previa in Jimma Medical Center from November 2020 to September 2021

5.5. Maternal Complication of Cases and Controls

With regard to Maternal Complications identified on presentation because of Placenta Previa Anemia is the most prevalent in the Cases group accounting for 52(65.8%) vs 40(12.6%) in the Control group. In the Post-Partum Period Patients Complicated with Placenta Previa are at risk having Puerperal Period

complications including either and/or Anemia, Peupural Sepsis ,wound infection accounting for 54 (63.4%) vs 74(23.4%) in the Control group.

Table 5:4 Maternal Complication of Cases and Controls in Jimma Medical Center from November 2020 to September 2021

		Cases N:79		Controls N: 316		P value
		No.	%	No.	%	
Hemorrhage Resulting in Hypotension		24	30.4	13	4.1	0.000
PPH		58	73.4	63	19.9	0.000
Anemia at Presentation	Severe Anemia	16	20.3	3	0.9	
	Moderate Anemia	7	8.9	5	1.6	
	Mild Anemia	29	36.7	32	10.1	
	Total	52	65.8	40	12.6	0.000
Morbidly Adherent Placenta		8	10.1	4	1.3	0.000
Blood Transfusion Needed		59	74.7	26	8.2	0.000
Hospital Stay	< 4 Days	14	17.7	268	84.8	
	≥ 4 Days	65	82.3	48	15.2	0.000
Complications	Complications of Anesthesia	11	13.9	8	2.5	0.000
	Complications of Surgery	10	12.7	18	5.7	0.137
Postpartum Period Complications	Yes	55	69.6	70	22.2	0.000
Anesthesia type	General	44	55.7	13	13.1	0.000
	Spinal	35	44.3	86	86.9	

5.6. Co–Occurrence of Other chronic Medical and/or Obstetrics Condition

With regard to Co-Occurrence of Chronic Medical illnesses about 19(24.1%) of Cases and 25(7.9%) of Controls have a Known Chronic Condition, from this the most common ones includes about [4(5.1%)] of patients have respiratory disease and about [3(3.8%)] patient have HIV/AIDS and Thyroid Disease

each. With regard to Presence of Other Obstetric condition About 44(55.7%) of Cases and about 146(46.2%) of Controls have additional Obstetric Complications identified with Preterm Labor [21(26.6%] , Placental Separation[8(10.1%)], Mal Presentation[8(10.1%)], IUFD[4(5.1%)] ,Preeclampsia [5(6.3%)]and IUGR[4(5.1%)]being the most common obstetric complications identified in the Cases group.

Table 5:5 Co–Occurrence of Other Chronic Medical condition and/or Obstetrics complications of Cases and Controls in Jimma Medical Center from November 2020 to September 2021

Medical and/or Obstetric Condition		Cases		Controls		Total		P value
		No.	%	No.	%	No.	%	
Chronic Medical Illness	Yes	19	24.1	24	7.6	44	11.1	0.000
	No	60	75.9	291	92.1	351	88.9	
Other Obstetric Complications	Yes	44	55.7	142	44.9	190	48.1	0.088
	No	35	44.3	170	53.8	205	51.9	

5.7. Neonatal Outcome and Complication of Cases and Controls

Majority of Newborns were Male in Both Cases and Control Groups, accounting for [42(53.2%) vs.171 (54.1%)] respectively. The Still birth rate in the Cases group higher than the Controls group which is [6(7.6%) vs. 17(5.4%)] respectively. Immediately after Delivery Newborns were assessed with APGAR score at 1^{st}, 5^{th} and 10^{th} minutes and found to have about 62(78.5%) of Cases and 239(75.6%) Controls had < 7 first minute APGAR score, and about 9(11.4%) Cases and 9(2. 8%) Controls had <7 fifth minute APGAR score. From this about 12(15.2%) Cases and 9(2.8%) Controls Newborns where complicated by ENND. Birth Weight was also assessed and found to be about 10(12.7%) of Cases and 8(2.5%) of Controls where having VLBW (1000gm-1499gm), 27(34.2%) of Cases and 31(9.8%) of Controls had LBW (1500-2499gm). With the regard to admission to NICU, about 27(34.2%) of Cases and 43(13.6%) of Controls Newborns Where Admitted NICU and from this Prematurity is the most

common reason of admission in the Case group accounting for 22(27.8%) of NICU admission. From those admitted to NICU, only 15(55.6%) of Cases and 30(69.8%) Controls Newborns where Discharged alive without any Complications. Presence of Lethal Congenital Anomaly is higher in the Case group than the control group with a present of [2 (2.5%) vs. 3(0.9%)].

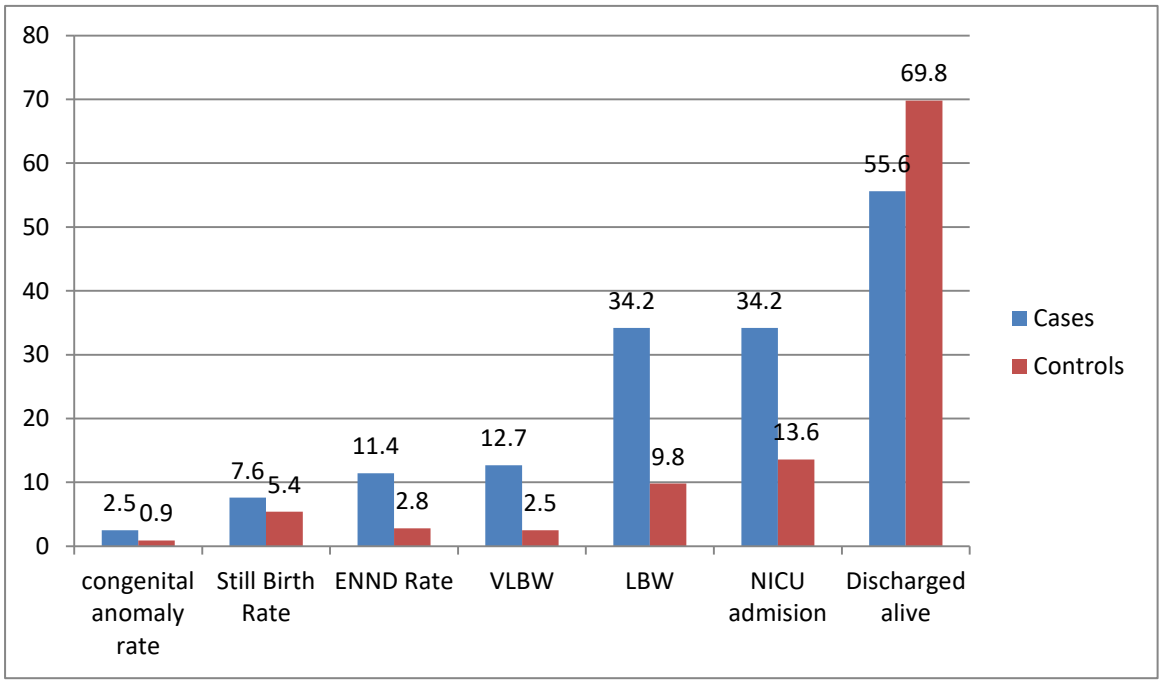

Figure 5:2 Comparison of Neonatal Outcome and Complications of Cases and Controls in Jimma Medical Center from November 2020 to September 2021

Table 5:6 Neonatal Outcome and Complications of Cases and Controls in Jimma Medical Center from November 2020 to September 2021

Neonatal outcome Complications			Cases		Control		P value
			No		No		
Sex		Male	43	54.4	168	53.2	0.840
		Female	36	45.6	148	46.8	
Birth Outcome		Alive	63	79.7	290	91.8	0.000
		SB	4	5.1	17	5.4	
		ENND	12	15.2	9	2.8	
1st min APGAR Score		<7	19	24.1	48	15.2	0.063
		>=7	56	70.9	251	79.4	
5th min APGAR Score		<7	9	11.4	1	0.3	0.000
		>=7	66	83.5	298	94.3	
Birth Weight		1000-1499	10	12.7	30	2 .5	0.000
		1500-2499	28	35.4	30	9.5	
		2500-3999	41	51.9	258	81.6	
		>=4000	-	-	20	6.3	
NICU Admission	Yes	Prematurity and Associated condition	22	27.5	8	2 .5	0.000
		Asphyxia	7	8.9	13	4.1	0.093
		Jaundice	6	7.6	13	4.1	0.232
		Total	27	34.2	43	13.6	0.000
	No		46	58.2	256	81	
Lethal Congenital Anomaly		YES	2	2.5	3	.9	0.261
		No	77	97.5	313	99.1	

5.8. Risk Factors Associated with Placenta Previa

Significant Risk Factors Associated with Placenta Previa After controlling with Age and Parity and also adjusting for Potential Confounder in MultiVariate Logistic Regression with backward Conditional Model is with women who had Previous history of Spontaneous Incomplete Abortion which needed Completion with Uterine Procedure, the study founded that Patients with Previous History of Spontaneous Incomplete Abortion had 11 times risk to develop Placenta Previa with [AOR 11.063; 95% CI: 1.41, 86.816] .After Adjusting with Confounders Women with previous history of induced

Abortion, Previous History of Cesarean Delivery and Women with Known Chronic Medical Illness were found to had no Significant Association with Placenta Previa. Summary of the Finding is shown on the Table Below.

Table 5:7 Binary and MultiVariate Logistic Regression of Risk Factors for Placenta Previa after Adjusting with Age and Parity and Controlling Covariates at JMC from November 2020 to September 2021

Risk Factors		Case N:(79)	Control N:(316)	P-Value COR(95%CI)	P- Value AOR(95%CI)
Previous Spontaneous Incomplete Abortion	Yes	21	7	0.000 15.983 (6.497,39.319)	0.022 11.063 (1.41, 86.816)*
	No	58	309	1.0	1.0
Induced Abortion	Yes	13	14	0.000 4.322 (1.989, 9.392)**	0.639 2.226 (0.079, 63.084)
	No	66	302	1.0	1.0
Previous History of Cesarean Delivery	Yes	16	20	0.000 3.733 (1.833, 7.605)**	0.110 0.002 (0.000, 4.079)
	No	63	296	1.0	1.0
Preexisting Problem and Chronic Illness	Yes	19	24	0.000 3.853 (1.986, 7.476)**	0.059 11.060 (0.914, 133.829)
	No	60	292	1.0	1.0

COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio , *Statistically Significant variables at P<0.05, **Statistically Significant variables at P<0.001, Hosmer-Lemeshow goodness of fit = 0.714

5.9. Maternal Complications of Placenta Previa

After adjusting for Age, Parity and Confounders**,** and with Forward Conditional Model : a Need for Blood Transfusion, Being Operated under General Anesthesia for Delivery, and Prolonged Hospital

Stay before Delivery and Anemia of Hemoglobin level less than 11g/dl were found to be significantly associated with Placenta Previa. The study founded that Patients with Placenta Previa had 15.7 times risk of having Blood transfusion than their counterparts with [AOR: 15.699, 95%CI 4.284, and 57.528]. The study also found that Placenta Previa Patients had about six times risk of Operated by General Anesthesia With [AOR: 6.268, 95%CI 1.741, 22.569]. Pregnant Ladies with Placenta Previa were also found to have prolonged stay at Hospital before Delivery, with The Probability of having prolonged Hospital Stay more than 4 days increased by 16 times than their counterparts with [AOR:16.623, 95%CI 6.781,40.752]**.** Patients with Placenta Previa also had eight times risk of being Anemic at presentation with Hemoglobin level below 11mg/dl with [AOR; 8.215, 95% CI 2.173, 31.054] However after adjusting for the confounders, Postpartum Hemorrhage, Postpartum Period complications, and Anesthesia Complications were not significantly associated with Placenta Previa.. The Table below shows Maternal Complications Associated with Placenta Previa.

Table5.7 Binary and Multivariate Logistic Regression for Maternal Complications Associated with Placenta Previa in JMC from November 2020 to September 2021

Maternal Complications		Cases N:79	Controls N:316	P Value COR (95%CI)	P Value AOR (95%CI)
A Need for Blood Transfusions	Yes	59	26	0.000 34.636 (18.001, 66.641)**	0.000 15.699 (4.284, 57.528)**
	No	20	290	1.0	1.0
Duration of Hospital Stay more than 4 days	Yes	65	48	0.000 21.556 (11.302, 41.112)**	0.000 16.623 (6.781,40.752)**
	No	14	268	1.0	1.0
Operated under General Anesthesia	Yes	44	13	0.000 8.316 (3.996,17.308)**	0.005 6.268 (1.741, 22.569)*
	No	35	303	1.0	1.0
Hg at Presentation Less than 11mg/dl	Yes	52	40	0.000 13.289 (7.507, 23.523)**	0.002 8.215 (2.173, 31.054)*
	No	27	276	1.0	1.0
Anesthesia Complications	Yes	11	8	0.000 6.228 (2.414, 16.069)**	0.482 3.053 (0.136, 68.422)
	No	68	91	1.0	1.0
PPH	YES	58	63	0.000 0.090 (0.051, 0.159)**	0.348 3.035 (0.298, 30.899)
	NO	21	253	1.0	1.0
Postpartum/Op Complications Including Anemia, Puerperal Sepsis and Wound infection	Yes	55	70	0.000 8.054 (4.655, 13.932)**	0.508 2.381 (0.183, 31.023)
	No	24	246	1.0	1.0

COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio , *Statistically Significant variables at P<0.05, **Statistically Significant variables at P<0.001, Hosmer-Lemeshow goodness of fit = 0.619

5.10.Neonatal Complications of Placenta Previa

After Adjusting with Maternal Age, Parity and Confounder, NICU Admission is significantly associated with Placenta Previ by using backward conditional Model. The Study shows that Babies Born to mothers from Placenta Previa were 11 times increased risk of being admitted to NICU with [AOR 10.952; 95%CI, , 1.374, 87.315]. After adjusted for Cofounders, bad perinatal outcome, Prematurity and its complications, Premature Birth, Low Birth weight and Unfavorable APGAR at 5th Min were not significantly associated with Placenta Previa. Summary of Neonatal Complications of Placenta Previa are summarized on table below.

Table5.8 Binary and Multivariate Logistic Regression for Neonatal Complications associated with Placenta Previa in JMC from November 2020 to September 2021

Neonatal Complications		Cases N:79	Controls N:316	P Value COR (95%CI)	P Value AOR (95%CI)
NICU Admission	Yes	28	39	0.000 3.972 (2.32, 7.068)**	0.024 10.952 (1.374, 87.315)*
	No	51	277	1.0	1.0
Bad perinatal outcome	Yes	16	26	0.003 2.833 (1.435, 5.590)	0.059 9.586 0.8965, 82.657
	No	63	290	1.0	1.0
5thMin Unfavorable APGAR score	Yes	9	1	0.000 40.636 (5.061, 326.288)**	0.626 2.562 (0.059, 112.174)
	No	70	315	1.0	1.0
Prematurity and its Complications	Yes	23	8	0.000 15.812 (6.736, 37.121)**	0.063 9.548 (0.882, 103.415)
	No	56	308	1.0	1.0
Premature Birth	Yes	38	30	0.000 0.102 (0.056, 0.184)**	0.880 0.683 (0.005, 95.296)
	No	41	186	1.0	1.0
Low Birth Weight	Yes	38	60	0.000 6.780 (3.887, 11.829)**	0.359 12.153 (0.058, 2525.964)
	No	41	256	1.0	1.0

COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio , *Statistically Significant variables at P<0.05, **Statistically Significant variables at P<0.001, Hosmer-Lemeshow goodness of fit = 0.714

Chapter 6: Discussions

6.1. Discussions

After controlling the known risk factors of Placenta Previa, Age and Parity, This Study investigated the association between other different risk factors and adverse Maternal and Neonatal outcomes with Placenta Previa. 4 Stillbirths and 12 ENNDs were recorded in this study. There were 2 Newborns with Lethally Congenital abnormalities. Making the Bad perinatal outcome as 2.8 times higher in the cases group than their counterparts [COR: 2.833, 95%CI 1.435, 5.590] this finding is almost similar with a meta-analysis done in USA which showed placenta previa had three times higher risk of perinatal death with [RR: 3.06; 95%CI 2.40, 3.94].(40) Although it is difficult to assess the true figure, the Perinatal death rate of cases is 202 in 1000 live births which is higher than the control groups which is 82 deaths in 1000 live births, this figure is lower than study done at this hospital and also at Hawasa which showed the perinatal mortality rate of placenta previa to be 309 and 447 in 1000 live births respectively.(41)(16) the reason in decrement from previous finding of perinatal death could be due to improvement in antenatal care and Neonatal care nationwide.(42) The magnitude of Placenta Previa observed was 1.48 %,(about 15 cases in 1000 deliveries). This result is slightly higher than the magnitude it was in the same Hospital on 2015 G.C which was 1.36%.(16) and much higher than the study conducted in Addis Ababa University which was 0.7%.(15), and also higher than its Pooled Prevalence of 0.52% and 0.27% globally and in Sub-Saharan Africa respectively.(43). This high prevalence finding with respect to the Global and Sub-Saharan Africa can be explained by the study type, as it is a Hospital based study, it cannot show the true prevalence of the case in the population. The increment from study done at Addis Ababa could be explained by the high fertility rate of the surrounding populations of JMC compared to Addis Ababa which is almost three times higher.(

fertility is 5.4 in Oromia vs 1.8 in Addis Ababa).(42) The increment from study done at the same hospital 7 years back could be explained due to proportional increment of the known risk factors associated with placenta previa including cesarean delivery rate , abortion rate .(44)

Since Both Maternal Age and Parity are controlled, other factors are looked for; and the only risk factor that is found to be associated with Placenta Previa is previous history of having Spontaneous Incomplete Abortion which needed Uterine Procedure for evacuation. The study founded that Patients with Previous History of Spontaneous Incomplete Abortion had 11 times higher risk to develop Placenta Previa than their counter parts , [AOR 11.063; 95% CI: 1.41, 86.816]. This is a similar finding, but higher than a Case Control Study done in Croatia in 2003G.C which showed Percentage of Previous Abortion was significantly higher among women with Placenta Previa , with increased Odds of ratio of 73%.(5) It also has similar but much higher finding than a Meta-analysis done on 2017 in Iran which included 20 studies and found that , Previous Spontaneous abortion has 64% increased Odds ratio of Placenta Previa.(45). The Reason could be due to increased safe induced abortion rate (from 22 to 28 per 1000 reproductive age women) and increased the number of women seeking treatment for post-abortion complications (from 52600 to 103600) in Ethiopia from in the years of 2008 to 2014.(46) The Mechanism how Previous abortions predispose to Placenta Previa development could be explained with possible endometrial damage during repeated Abortions and Uterine Procedures which impedes successful fundal implantation of Placenta.(5)(47). The study done at Addis Ababa university didn't found significant association between placenta Previa and previous abortion.(15)

The Study found that although significant number of Women (20.2%) had Previous Cesarean Delivery, which is another known Risk Factor for Placenta Previa. But when adjusted for confounders it was found to have no significant association. This finding is in contrast to study done in Addis Ababa University which showed three times increased risk.(15) Global meta-analysis studies also showed

previous Cesarean delivery had increased Odds of ratio of 64% for placenta previa (7). This difference might be explained due to the study design and small Sample size and/or it could also be explained as this study was conducted on Hospital Based, which a Preferred is and recommended Place of Delivery for High risk Mothers including women who had previous Cesarean Scar. So, these could increase the total number of Mothers who had previous Cesarean scar in the Control group unlike the total prevalence in the population and/or Health center, which indirectly masks the large number of mothers who had previous scar and placenta previa this is supported by previous studies as history of obstetric difficulties increased institutional delivery by 6 times (48)

This study found that a Need for Blood Transfusion, Prolonged Hospital stay, Operation under General Anesthesia and Anemia with Hemoglobin less than 11mg/dl are the major Maternal Complication found to be significantly associated with Placenta Previa. Patients with Placenta Previa had about 15 times high likely to need a blood transfusion than their counterparts. This finding is similar but significantly higher than the study done in Addis Ababa University, which was 3 times increased risk.(15) it is also higher than study done at Columbia University which was 68.8% increased Odds of being transfused.(49) but it's almost the same to study done at Canada which showed Placenta previa had 11 times relative risk of having blood transfusion.(50) This higher risk of blood transfusion need in this study could be explained by delay in Presentation to Hospital of patients in this study group, in which their mean time of Presentation after Bleeding started to Presentation to Hospital is 6.32 hours. Most of the cases (N: 58) are also from rural area with mean distance of their hometown from JMC was 67.2 km. So prevalence of this both factors in our study group favors in delay of Presentation and which may have resulted in excessive hemorrhage of the patients at presentation and increased the need for blood transfusion in contrast to the other studies.(49)

The other Problem found to be significantly associated with Placenta Previa is Operation under General Anesthesia , with Pregnant women with Placenta Previa had about 6 times high likely Probability to being Operated by General Anesthesia unlike their Counterparts. This finding is similar to study done in SoudiArabia in 2008, which showed Presence Antepartum Hemorrhage due to Placenta Previa had 3.1 times increased Odd of Operating under General Anesthesia. A retrospective Study done on Management of anesthesia for cesarean section in parturient with placenta previa with/without placenta accrete also showed general anesthesia was preferred in the parturient with placenta previa .(51)

The reason behind preference of General Anesthesia over Regional by both anesthetist and surgical team could be explained by the Presentation of most of Patients in this study, where most of them presented late after bleeding started and developed low level of Hematocrit and deranged vital signs. The other reason could be the urgency required at presentation of patients with placenta previa with only 27.8% of the cases was operated with elective surgical plan. All of which could increase the exposure to General Anesthesia of patients with placenta previa unlike their counterparts.(52).

The Other Significantly associated factor found was Hospital stay before Delivery. The Mean Hospital Stay before delivery of the Cases were 180 hours .The Probability of Patients with Placenta Previa are found to have a 16 times increased Odds of to stay more than 4 days at Hospital than their Counter Parts. Although the study done at Addis Ababa University didn't Put its significance the Mean Total Hospital Stay was 14.27±9.862 days and in this study it was 12.32 days which are almost similar and both are higher than study done by CDC which showed the average length of Hospital stay of Cesarean delivery mothers was 4.1 days.(15)(53)

Large number of Women had Post-Partum Hemorrhage (N: 58, 73.4%) associated with Placenta Previa , However according to this study when adjusted with confounders in Multivariate Logistic Regression

it was found to have no significant association between Post-Partum Hemorrhage and Placenta Previa. In contrast to this study previous studies had shown that Placenta Previa increases the risk of Postpartum Hemorrhage by as much as 9.7% to 17.5 %. The reason behind this could be, there may be increased risk of morbidly adherent Placenta and Cesarean Hysterectomy. The other reason is bleeding from Placental bed as the Lower segment fails to contract and stop bleeding. Morbidly Adherent Placenta which is one of the major causes of postpartum hemorrhage in placenta previa patients is only 8(10.1%) and was not significantly associated with placenta previa, and all of them were managed with conservative method by removing the placenta with curettage and didn't require cesarean hysterectomy , this finding is much lower than study done in Egypt which resulted 26.4% of women with Placenta previa had complicated with morbidly adherent placenta and 15.1% of them had cesarean hysterectomy.(3) The other reason could be the low prevalence of anterior placenta (30.1%) a known risk factor for Postpartum hemorrhage in this study. All of these resulted decrement in significance of Postpartum Hemorrhage in this study (3,12–14). The reason behind its discrepancy with the need of transfusion and Postpartum hemorrhage is the presentation of the patients in this study, as most of them were not detected as having placenta previa on ante natal care and diagnosed during intrapartum and presented with antepartum hemorrhage much higher (88.6%) in contrast to global pooled prevalence of 51.6%. The other reason could be due to delayed presentation of patients in this study due to rural residency(73.4%), far from this hospital (mean distance of 67.2km) and illiteracy(45.6%) all of them could have resulted in delayed presentation and increased risk of blood transfusion. (54)

This study showed that Most Patients had Anemia at presentation (N:52) when adjusted with confounders it was found to be patients with placenta previa to be presented with anemia of Hemoglobin less than 11g/dl is 8.2 times higher than their counterparts.This finding is similar but lower than the study done at Addis Ababa university which showed patients with placenta previa were

fourteen time higher than their counterparts. The reason behind lower in this study is due to the difference in time of determination of hemoglobin level between the two studies. This study tried to assess the hemoglobin level at presentation before any intervention and the previous study assessed hemoglobin level after delivery , which could be aggravated by and also presence of postpartum hemorrhage and the value could also be affected the management given. The finding is also similar with study done by sheiner and its colleague which showed placenta previa had six times increased risk of having low hemoglobin level. This can be explained by scientific evidence of Hemorrhage in Ante Partum Period is associated to Placenta Previa which may lead to decline in Maternal Hemoglobin Level unless intervention is made.(7,15)

In this Study Significantly associated Neonatal Complication with Placenta Previa is Admission to NICU. It was found that Neonates Born to Placenta Previa Mothers had about 11 times high Likely Probability to be admitted to NICU.This finding is significantly higher than study done in Addis Ababa University where NICU admission was insignificant at that study. The study done in Egypt also showed Placenta previa had 22.06% increased risk of NICU admission compared to their counterparts? The study done in USA also showed about 3.8 times increased risk of being admitted to NICU. The reason behind this increased admission in this study is due to high number of newborns were preterm and low birth weight. (15,55) (56)

However Preterm Birth, Low Birth Weights and Prematurity and its Associated Problems were found not significant when adjusted for confounders. Low Birth weight Newborns number in this study was large (N: 38, 48.1%), However no significant association between Placenta Previa and Low Birth weight of Neonates were found when adjusting for confounders. Similar result was found in the study done at Addis Ababa University; In contrast several Prior studies had shown an association between

placenta previa and low birth weight. The discrepancy from the other studies could be due to difference in study design and Sample size and/or high prevalence of low birth weight newborns in the control group which could be explained by deferent factors that this study didn't reached at.(11,15,32)

According to this study Significant Number of Neonates Born to Placenta Previa are Preterm (N39, 49.4%), However no significant association was found with Placenta Previa when adjusted for confounders. This finding is in contrast to study done at Addis Ababa University which showed Newborns of Placenta Previa mother had 8 times increased risk of being Preterm which was also comparable to study done in Danish National Cohort study. The discrepancy of this study from others may also be explained by difference in study design and also sample size. The sample size of study done at Addis Ababa is 606 and that of Danish cohort study was 1721 cases in which both studies had higher sample size number. The confounders for the low birth weight including preexisting chronic medical illness (N: 19, 24.1%) and other Antenatal and /or intra natal obstetric problems identified (N: 44, 55.7%) were also high in this study Which could have made low birth weight insignificant. (15,20)

Newborns born to pregnant women having Placenta Previa are were also at risk of Having Prematurity complications , this study found no statistical association of Prematurity complications to Placenta Previa unlike prior studies done at Addis Ababa University and Scotland which showed about eight times and five times increased risk.(15,21). This discrepancy could be due to difference in the study design and also Sample size.

6.1. Strength of the Study

- ✓ The study has included all Placenta Previa Cases in the given study time except 02 cases which are Twin Pregnancy excluded from analysis. So this avoids selection Bias of Cases
- ✓ Controls were also selected by matching age and Parity to Cases which minimized the possible confounders that affects results and also reduces the possible selection bias in the controls also difficult to avoid by 100%.

6.2. Limitations of the Study

- ✓ The study was conducted on Facility Based in which the results may not be applicable on the whole population.
- ✓ Calculation of gestational age for stillborn with unknown early milestone was difficult.
- ✓ Calculation of true Perinatal Death rate for cases and controls was difficult because of difficulty of following the progress of newborns who were discharged before 7^{th} day of life.
- ✓ Due to limitation of the study period, it was able to get only 87.7% of the sample size required.

Chapter Seven: Conclusions and Recommendations

7.1. Conclusions

This study showed that after adjusting Maternal Age and Parity, Previous history of Spontaneous Incomplete Abortion is a significant risk factor of Placenta Previa. Maternal Complications significantly Associated to Placenta Previa were an increased Need for Blood Transfusion , Anemia of Hemoglobin less than 11g/dl of at presentation , Prolonged Stay at Hospital before delivery and Exposure to General Anesthesia for Delivery. Newborns Born to women who had Placenta Previa were also at increased risk of being admitted to NICU.

7.2. Recommendations

The following recommendations were derived in the view of the results of this study

- ✓ Patients with Placenta Previa are at increased risk of hemorrhage so compatible blood needs to be available for such cases before considering surgical Operation.
- ✓ The study shows Placenta previa mothers needs admission and delivery in a well established and well organized NICU setup.
- ✓ Further large Scale Study with large number of sample size should be conducted to further assess the prevalence of placenta previa and its adverse Maternal and Neonatal complications.

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Annex I Questionnaires

Information sheet Good morning? / Good afternoon? My name is Dr.Atsinagn Girma. I am final year of obstetrics and gynecology resident at of Jimma University. I am conducting a study on Maternal and Fetal Outcomes of Pregnancies complicated by Placenta Previa among mothers deliverd in JMC for my partial fulfillment of the requirements for the master degree in Obstetrics and Gynecology. You are chosen to participate in the study. We need to collect data about socio-demography and economic information from you. The chart of the deceased will be reviewed to get data about your obstetric characteristics and pregnancy outcome. I want to assure you that all of your answers will be kept strictly secret. I will not keep a record of your name or address. You have the right to stop the interview at any time, or to skip any questions that you don't want to answer. Your participation is completely voluntary but your experiences could be very helpful to design a better action plan to mitigate Maternal and Fetal Outcomes occurring from the same scenario in the future.

If you agree to participate in the study, interview will take about 30 minutes to complete. Do you have any questions?

Consent form

Do you agree to be interviewed?

Yes No

May I begin the interview now?

To be signed by interviewer: I certify that I have read the above consent procedure to the participant.

Signed: _____

I Socio demographic Characteristics

No.	Question	Answers	Remark
101	Card no.		
102	Age	……	
103	Address	Region	
		Zone/sub-city	
		Woreda	
		Kebele	
		House number	
201	Ethnicity	Oromo	
		Amhara	
		keffa	
		Tigire	
		Others	
202	Marital status	Single	
		Married	
		Divorced	
		Widowed	
203	Religion	Orthodox	
		Muslim	
		catholic	
		Protestant	
		Others	
204	Level of education	Canot read and write	
		No formal education ,but can read and write	
		Grade 1-8	

		Grade 9-12	
		College & above	
205	Occupation	Professional	
		Sales and Services	
		House wife	
		Farmer	
		Student	
		Dependant	
		Others	
206	Place of Residency	Rural	
		Urban	

III Obstetric history and Risk Factors

301	Reproductive History, Parity?	1	
		2-4	
		5 fi oli	
302	Did you have previous history of Abortion?	Yes	
		No	
303	If yes to above question type of abortion	Induced	
		Spontaneous	
304	If it was Induced , what is the mode of induced abortion?	Medical abortion	
		MVA	
		D&C	
		Uknown	
305	If it was spontaneous ,was It Complete?	Yes	
		No	
306	If No to the above question what type of procedure done to complete it ?	MVA	
		D&C	
		Unknown	
307	Previous history of suction curretage for GTD	Yes	
		No	
308	GA _____	……	
		……torbeen	
309	ANC Visit	Booked	
		Unbooked	
310	If Booked to above question , where is the ANC?	Health post	
		Health center	
		Hospital	
		Other	

311	If Booked How many visit ?	1	
		2	
		3	
		4	
312	Previous History of Ceserean Delivery	Yes	
		No	
313	Type of Ceserean Delivery	Emergency	
		Elective	
314	If Yes to Question no 4 , What Type of Incision was it?	LUSTC/S	
		Low Vertical	
		Classical	
		Unknown	
315	Number of previous Ceserean Section	1	
		2	
		3 fi olii	
316	Previous Other Gynecologic Surgery or Procedure	Yes	
		No	
317	If Yes to Question no 8 , what type of surgery or procedure is It ?	Myomectomy	
		D & C	
		Uterine Repair	
		Other	
318	Do you smoke cigarette ?	Never smoked	
		Former smoker	
		Stopped before conception	
		Stopped during first triminister	
		Smoked throughout pregnancy	
319	If you are /were smoker, cigarettes smoked per day	≤ 9	
		≥ 10	
320	Antenatal/ intranatal problems/risks (Tick ALL that apply	Pre eclampsia / eclampsia	
		Anaemia	
		UTI/pyelonephritis	
		Abnormal lie/presentation.	
		Other (specify)	
321	If yes to above question do you have any Pre existing problems (Tick ALL that apply)	Hypertension	
		Cardiac problem	
		Renal	
		Diabetes	
		Anaemia	

		HIV AIDS	
		Hepatitis	
		Asthma	
		Other (Specify)	

III **Maternal Outcome**

401	Is their Antepartum bleeding ?	Yes	
		No	
402	Frequency of Antepartum Bleeding	1	
		2	
		3	
		4 and above	
403	What is the Hemoglobin level by mg/dl at presentation (mg/d)l	≤ 7	
		7 - 9.9	
		10- 12.5	
		≥ 12.5	
404	Onset of Labor ?	Spontaneous	
		Induced	
		No labor	
405	Mode of delivery?	Spontaneous vaginal delivery b. (SVD)	
		Operative vaginal delivery (vacuum or forceps)	
		Destructive vaginal delivery for dead fetal outcome (Distructive)	
		Operative Abdominal delivery (caesarean section or Hysterectomy)	
406	If C/S is the mode of delivery , is their any intraoperative complications?	Yes	
		No	
407	If yes to above question , what is it??	Complication of anesthesia	
		Complication of surgery	
		Other , specify)	
408	What are complications of surgery ?	Ceserean Hysterectomy	
		Bladder Injury	
		Placenta previa accrete	
		Extensions	
		other	
409	Is their Postpartum Hemorrhage	Yes	
		No	
410	Is their any need of	Yes	

	Transfusion?	No	
411	If yes to above question , How many units?	1	
		2	
		3	
		h 4and above	
412	Is their any Post Operative or /and Postpartum complications?	Yes	
		No	
413	If yes to above question what is it?	Postpartum Infection and sepsis	
		Wound dehiscense	
		Anemia	
		Other and specify	
414	Duration of stay at Hospital before delivery Specify	≤ 24 Hours	
		24hr to 3rd day	
		3rd day to 7th day	
		7 day to 14 th day	
		> 14 day	
415	Total stay at Hospital? Specify	≤ 24 Hours	
		24hr to 3rd day	
		3rd day to 7th day	
		7 day to 14 th day	
		> 14 day	
416	Is their any need for ICU admission?	Yes	
		No	
417	Status of the mother on discharge?	Improved	
		Complicated by maternal death	
418	If its Complicated by maternal death, what is the immediate cause of death? Specify		
419	State of Pregnancy at the time of death?	Antepartum	
		Intrapartum	
		Postpartum	

V Neonatal Outcome

501	**Neonatal Outcome**	Sex	M	
			F	
		Weight		
		Status	Alive	
			StillBirth	

			ENND	
		Apgar score at 1st and 5th minute		
		Gestational age		
502	Does the Newborn has lethal congenital anomaly? Specify		Yes	
			No	
503	If alive, Any need for NICU admission?		Yes	
			No	
506	If yes to above question , reason of admission to NICU?		Prematurity with respiratory problem	
			Neonatal sepsis	
			Asphyxia	
			Meconium Aspiration Syndrome	
			Hyperbilirubinemia	
			Others and specify	
507	Status of the New born finaly		Discharged improved	
			ENND	
			Alive till 7th day	
			Unknown	
508	If complicated by ENND, when was the time of death respective to age?		Within 24 hr	
			24 - 72 hr	
			72 hr - 7 day	
509	If complicated by ENND, what is the immediate cause of death?		Respiratory	
			Multi organ failure	
			Lethal congenital malformation	
			Unknown	