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Research Article

To Study the Factors Associated With Post Partum Haemorrhage and Management of Post Partum Haemorrhage at a Tertiary Health Care Centre of Rural India - A Cross-Sectional Study

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ABSTRACT

Background: Postpartum hemorrhage (PPH) is one of the most critical and life-threatening obstetric emergencies, capable of transforming an otherwise uncomplicated delivery into a fatal event. If left untreated, severe hemorrhage can result in rapid maternal death, even in previously healthy women. Among the four stages of labor, the third stage is particularly crucial, as it is during this period that the most dreaded complication - PPH may arise. Affecting approximately 2% of all women who give birth, PPH accounts for nearly one-quarter of all maternal deaths globally and remains the leading cause of maternal mortality in many low-income countries, including India

Aim and Objectives: 1. To identify and analyze the factors associated with postpartum haemorrhage (PPH) and to evaluate the management practices of PPH at a tertiary health care center in rural India.2.To study the most common factor associated with postpartum haemorrhage (PPH).3. To determine maternal outcomes and complications associated with PPH

Methodology: Study Design: A cross-sectional observational study.

Study Setting: Labor ward, Obstetrics and Gynaecology department, at a GMC Gondia.

Study Population: Women admitted at the tertiary care hospital with obstetric haemorrhage.

Study Period: 18 months, May 2023 to October 2024

Sample Size: 89

Results: Majority of the study subject belonged to the age group of less than 25 years, i.e. 48 out of 89 cases Majority of study subjects belonged to lower middle-class family i.e. 66 out of 89 cases (74.1%), Majority of study subjects were primigravida i.e.29 out of 89 cases (32.6%), Majority of study subjects belonged to more than 37 weeks 60 out of 89 cases, The most common high-risk factor associated with postpartum heamorrhage was anaemia i.e. 26 out of 89 cases (29.2%), followed by pregnancy induced hypertension i.e. 23 out of 89 cases (25.8%). There were 13 cases of abruptio placenta, 17 cases of grand multi para, 11 cases of previous LSCS, 7 cases of multiple gestation, 12 cases of prolonged labour, 5 cases of placenta previa, 5 cases of thrombocytopenia, vaginally delivery 61, LSCS 28, main type of PPH was atonic, seen in total 58 out of 89 cases (65.1%), Majority of the patients were managed by blood transfusion for correcting anaemia, i.e. 80 out of 89 cases (89.9%), also by pharmacological agents 88 cases out of 89 (98.9 %) i.e. with 20-40 units of Pitocin, and other uterotonic drugs like carboprost and methergine, and 18 cases out of 89 cases (20.2%) were managed conservatively with ballon tamponade. 28 cases surgically managed.

Conclusions: Postpartum hemorrhage continues to be the leading cause of maternal mortality worldwide. Postpartum hemorrhage can be managed effectively by early and timely diagnosis followed by proper monitoring of high-risk cases and active management of third stage of labour with use of uterotonics like oxytocin, misoprostol, Carboprost and methergine and blood transfusions whenever indicated and skillful surgical while in some cases surgical intervention may be required.

Keywords: Postpartum Hemorrhage, Risk Factors, Maternal Morbidity &Mortality, PPH Management.

INTRODUCTION

Postpartum hemorrhage (PPH) is one of the most critical and life-threatening obstetric emergencies, capable of transforming an otherwise uncomplicated delivery into a fatal event. If left untreated, severe hemorrhage can

result in rapid maternal death, even in previously healthy women[1]. Among the four stages of labor, the third stage is particularly crucial, as it is during this period that the most dreaded complication - PPH may arise. Affecting approximately 2% of all women who give birth, PPH accounts for nearly one-quarter of all maternal deaths globally and remains the leading cause of maternal mortality in many low-income countries, including India[2]. Beyond its immediate fatal consequences, PPH also contributes significantly to severe maternal morbidity, long-term disability, and other complications associated with excessive blood loss, including shock and multiple organ dysfunction. According to global estimates, approximately 5,29,000 maternal deaths occur annually, with India contributing 1,36,000 deaths, representing 25.7% of the global maternal mortality burden. Alarmingly, two-thirds of these maternal deaths occur after childbirth, with PPH being the most frequently reported cause[3].

The definition of PPH varies across different medical institutions and organizations. The World Health Organization (WHO) defines PPH as blood loss of 500 mL or more within 24 hours after birth, with severe PPH characterized by blood loss exceeding 1000 mL[4]. The Royal College of Obstetricians and Gynaecologists classifies PPH as blood loss of 500 mL or more from the genital tract within 24 hours after delivery, further categorizing it as minor (500–1000 mL) or major (more than 1000 mL). Similarly, the American College of Obstetricians and Gynecologists (ACOG) initially defined PPH as blood loss exceeding 500 mL for vaginal deliveries and more than 1000 mL for cesarean sections, later updating the definition to include cumulative blood loss of 1000 mL or more or blood loss accompanied by signs of hypovolemia within 24 hours after childbirth. Other researchers classify PPH into medical and physiological definitions, with the medical definition considering blood loss greater than 499 mL and the physiological definition referring to any volume of blood loss that results in signs of shock or anemia, which can vary among individuals[5,6].

The most common cause of PPH is uterine atony, the failure of the uterus to contract effectively after placental delivery, leading to continuous blood loss. This type, known as atonic PPH, accounts for the majority of cases[7]. While PPH typically occurs within the first 24 hours post-delivery - termed immediate PPH - some cases extend up to six weeks postpartum, known as delayed PPH. Other contributing factors include retained placental fragments, trauma to the birth canal, and coagulopathies. The risk of PPH is further amplified by predisposing conditions such as prolonged labor, multiple pregnancies, polyhydramnios, hypertensive disorders, and maternal anemia[8].

Managing PPH in rural healthcare settings presents significant challenges, including inadequate access to skilled birth attendants, delays in referral systems, and limited availability of essential resources such as blood transfusion services and uterotonic medications. The cornerstone of PPH prevention lies in the active management of the third stage of labor, which includes the timely administration of uterotonic agents, controlled cord traction, and uterine massage[9]. However, once hemorrhage occurs, swift and aggressive intervention is crucial. Management strategies range from intravenous fluid resuscitation and the administration of tranexamic acid to advanced measures such as uterine tamponade, uterine artery ligation, or hysterectomy in severe cases. The effectiveness of these interventions is largely dependent on the healthcare infrastructure, availability of trained personnel, and access to emergency obstetric care, all of which are often inadequate in rural areas[10].

The prevalence of PPH in rural India varies based on healthcare access, antenatal care utilization, and the rate of institutional deliveries. The high burden of maternal anemia in these settings further exacerbates the severity of blood loss and increases the risk of adverse outcomes[11]. Understanding the epidemiology of PPH in rural tertiary healthcare centers is essential to developing targeted interventions that improve maternal outcomes. Strengthening health systems, ensuring timely management, and addressing barriers to emergency obstetric care are critical steps in reducing maternal mortality due to PPH. This study aims to explore the factors associated with PPH and evaluate its management practices in a rural tertiary healthcare center, ultimately contributing to improved maternal healthcare and policy recommendations for reducing preventable maternal deaths[12].

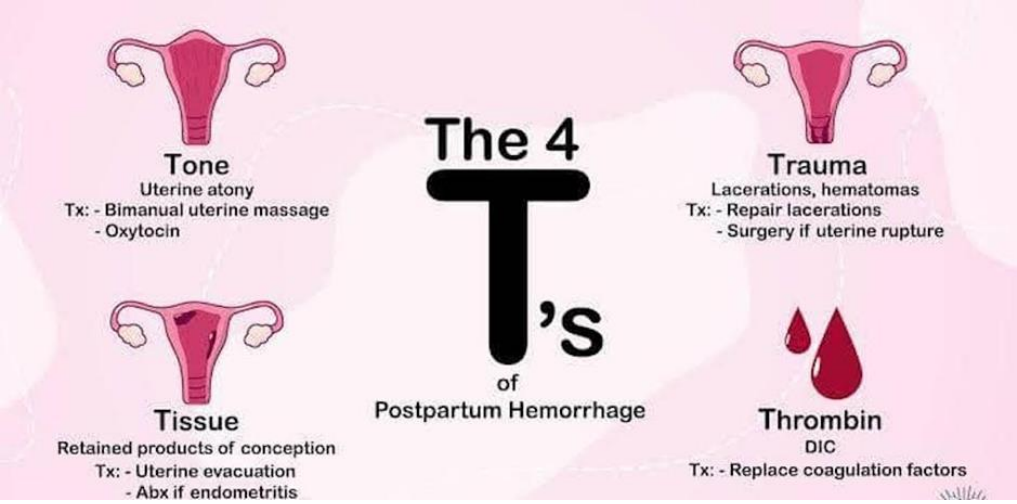

Figure 1: Causes of Postpartum Hemorrhage

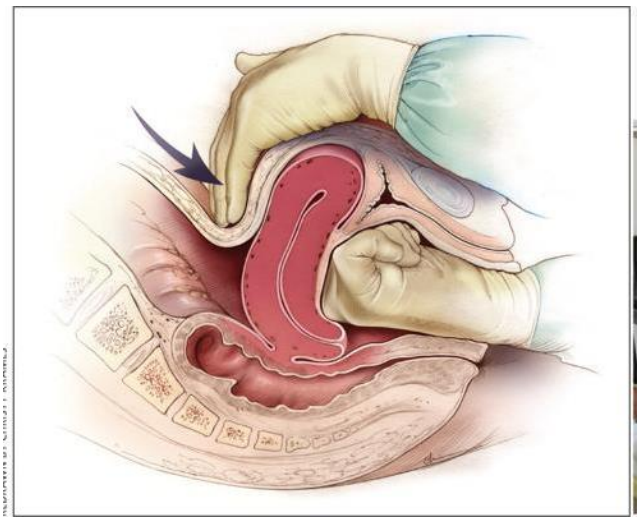

Figure 2: Bimanual Uterine Compression

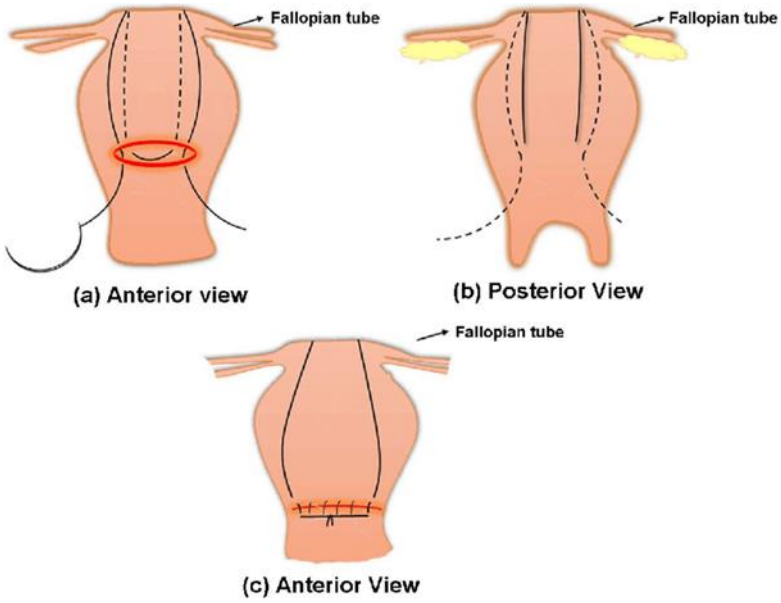

Figure 3: B-lynch suture technique

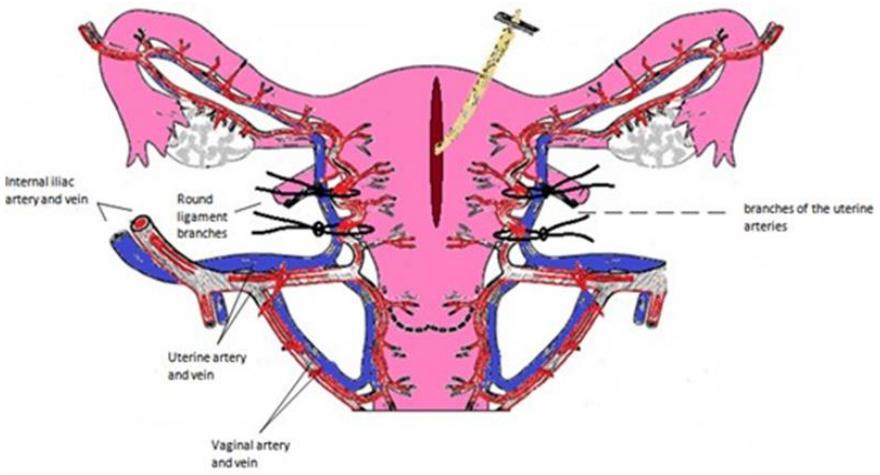

Figure 4: Uterine artery ligation

Aim and Objectives

Aim

To identify and analyze the factors associated with postpartum haemorrhage (PPH) and to evaluate the management practices of PPH at a tertiary health care center in rural India.

Objectives

1. To study the most common factor associated with postpartum haemorrhage (PPH).2. To assess the demographic and obstetric profile of women with PPH.3. To evaluate the clinical management strategies used for PPH.4. To determine maternal outcomes and complications associated with PPH.

Material and Methods

Study Design: A cross-sectional observational study. **Study Setting:** Labor ward, Obstetrics and Gynaecology department, at a GMC Gondia. **Study Population:** Women admitted at the tertiary care hospital with obstetric haemorrhage. **Study Period:** 18 months, May 2023 to October 2024 **Sample Size:** 89

Inclusion Criteria:

All the patients in the labour room, observation room post-delivery and PNC ward with a diagnosis of post-partum haemorrhage.

Exclusion Criteria

1. Patients referred with irreversible shock/ sepsis/ multiorgan dysfunction syndrome.2.Bleeding due to other medical cause.3.Gynaecological bleeding.4.Patients unwilling to participate.

Sample Size Calculation: We use OpenAPI software version3.0.3 to calculate the sample size according to following specification that is 95% confidence level, 90% power & considering 5.7 as the prevalence (167), the sample size estimated was 89.

$$\text{Sample size} = \frac{Z1\text{-}22p\ (1\text{-}p)}{d2}$$

Here,

Z_1 = Is standard normal variate (at 5% type 1 error ($P<0.05$) it is 1.96 and at 1% type 1 error ($P<0.01$) it is 2.58). As in majority of studies, P values are considered significant below 0.05 hence 1.96 is used in formula. p = Expected proportion in population based on - previous studies or pilot studies. d = Absolute error or precision - Has to be decided by researcher. The required sample as per the above-mentioned calculation was 89.

Approval for the Study

Written approval from Institutional Ethics committee was obtained beforehand. Written approval of OBGY and another related department was obtained. After obtaining informed verbal consent from all cases admitted at the tertiary care, hospital with obstetric haemorrhage such cases were included in the study.

Study Procedure

Study subjects were enrolled after obtaining clearance from ethics committee. All the subjects were explained in detail about study procedure in language she understands. Informed written consent was obtained from study participants. Predesigned and pretested study proforma was used as a tool for data collection. Data was collected about sociodemographic characteristics, Parity, gestational age in weeks, ANC visits, risk factors, type of delivery, type of PPH, Maternal complication, maternal morbidity and Mortality, PPH management all noted in patient proforma.

Data Analysis

All the data collected was entered in excel spreadsheet and analyzed using SPSS version 21 software. Chi square test was used to study associations. P<0.05 was considered as significant.

RESULT AND OBSERVATIONS

Table no.1: Distribution of subjects according to Age

Age	Cases	Percent (%)
≤20	5	5.6
21-25	43	48.3
26-30	29	32.6
31-35	11	12.4
≥36	1	1.1
Total	89	100.0

Majority of the study subject belonged to the age group of less than 25 years, i.e. 48 out of 89 cases (53.9%) and maximum cases were between 21 to 25years of age 48.3%, and 29 cases i.e. 32.6 % of study subject belonged to the age group of 26-30 years.

Table no. 2: Distribution of subjects according to Socio Economic Status

Socioeconomic Status	Cases	Percent (%)
Lower	17	19.1
Lower middle	66	74.1
Upper middle	2	2.2
Upper lower	4	4.5
Total	89	100.0

Majority of study subjects belonged to lower middle-class family i.e. 66 out of 89 cases (74.1%) and 19.1% of subjects belonged to lower socioeconomic class.

Table no. 3: Distribution of cases according to parity and Gestational Age

Parity	Cases	Percent (%)
Primigravida	29	32.6
Previous 1 delivery	23	25.8
Previous 2 delivery	20	22.5
Previous 3 delivery and more	17	19.1
Total	89	100.0
Gestational Age	Cases	Percent (%)
28-33 weeks	7	7.9
34-37 weeks	22	24.7
>37 weeks	60	67.4
Total	89	100.0

Majority of study subjects belonged to more than 37 weeks 60 out of 89 cases belonged to more than 37 weeks of gestation (67.4%), 22 out of 89 cases (24.7%) belonged to 34 to 37 weeks of gestation,7 out of 89 cases belonged to 28 to 33 weeks (7.9%). Majority of my study subjects were primigravida i.e.29 out of 89 cases (32.6%), 23 out 89 cases were second gravid (25.8%), 20 out of 89 cases were third gravida (22.5%), 17 out of 89 cases were more than 3 gravida status (19.1%).

Table No. 4: Distribution of Cases According to Mode of Deliver

Mode of delivery	Frequency	Percent (%)

Vaginal delivery	61	68.5
LSCS	28	31.5
Total	89	100.0

In the present study, it was observed that 68.5% study subjects i.e. 61 out of 89 delivered vaginally, while 31.5% study subjects i.e. 28 out of 89 cases required LSCS

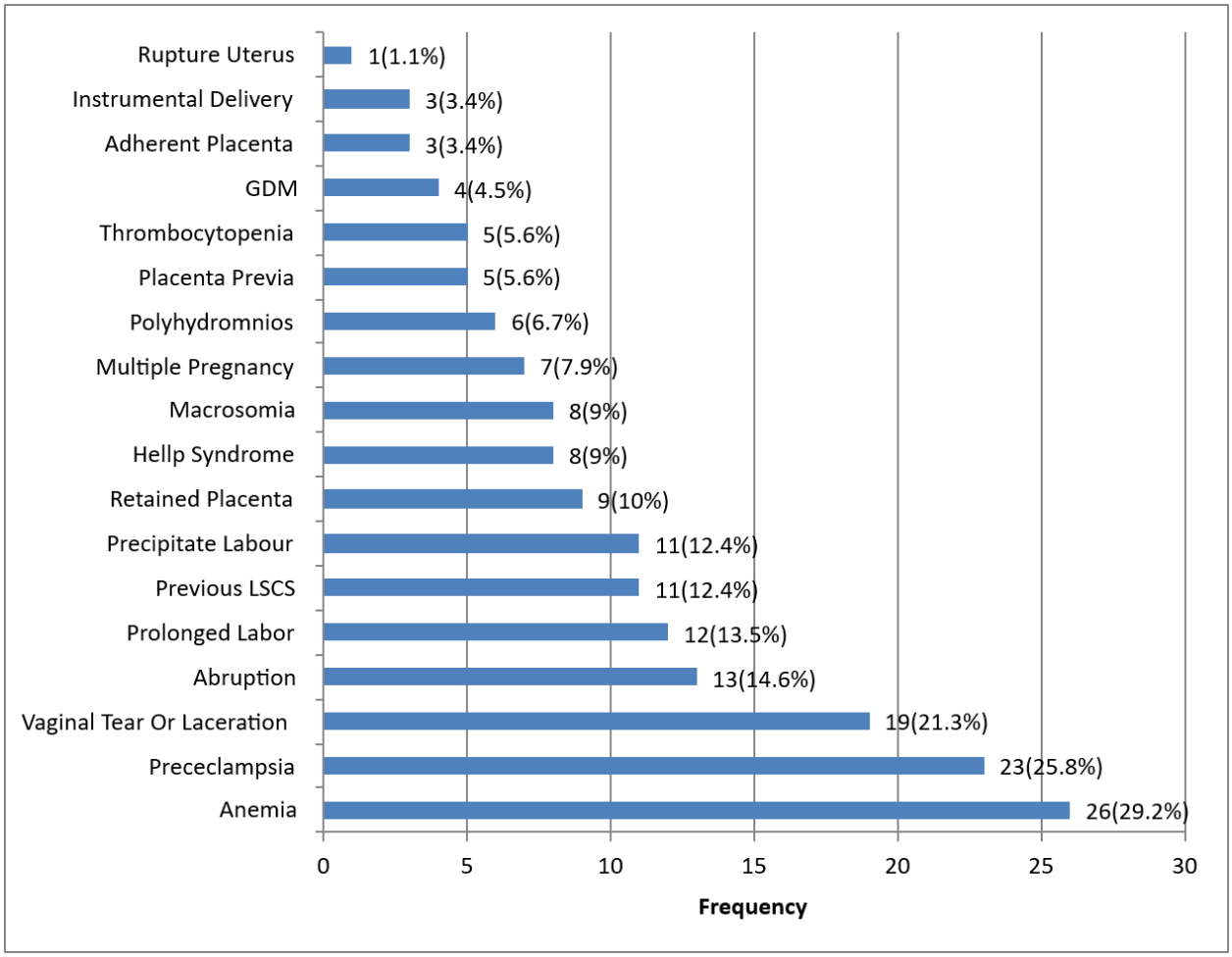

Image no.1: Distribution of subjects according to Associated High-Risk Factors

The most common high-risk factor associated with postpartum heamorrhage was anaemia i.e. 26 out of 89 cases (29.2%), followed by pregnancy induced hypertension i.e. 23 out of 89 cases (25.8%). There were 13 cases of abruptio placenta, 17 cases of grand multi para, 11 cases of previous LSCS, 7 cases of multiple gestation, 12 cases of prolonged labour, 5 cases of placenta previa, 5 cases of thrombocytopenia, 6 cases of polyhydramnios, 8 cases of HELLP syndrome, 8 cases of macrosomic baby, 9 cases of retained placenta, and 4 cases of gestational diabetes mellitus, 3 cases each of adherent placenta, 1 case of ruptured uterus, 3 cases of instrumental delivery, and no cases of inversion of uterus.

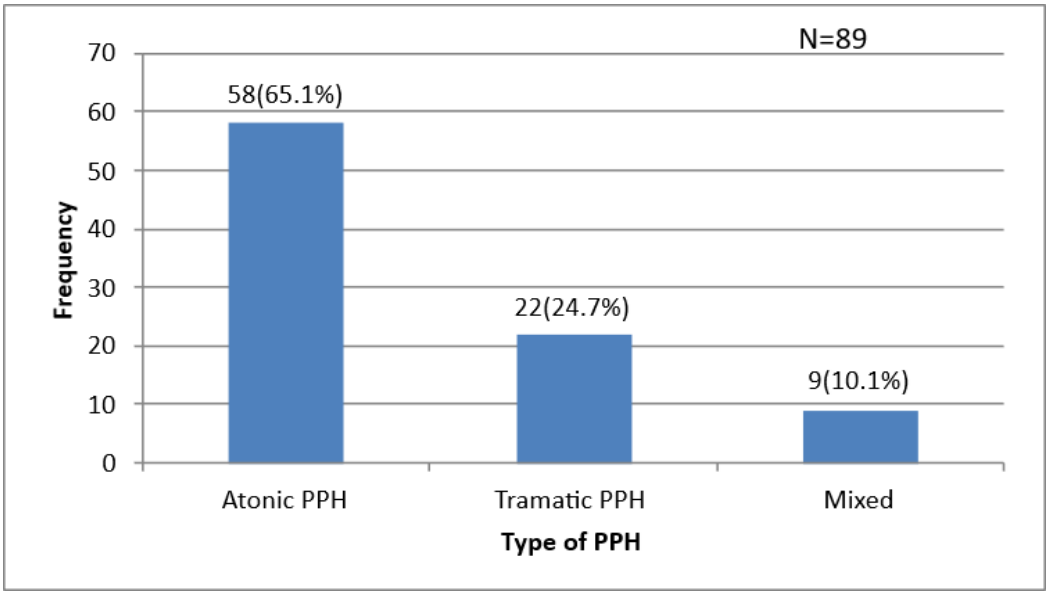

Image No. 2: Distribution of Subjects According to Type of PPH

Most common type of PPH was atonic, seen in total 58 out of 89 cases (65.1%), while traumatic PPH was second most common cause noted among total 22 cases out of 89 cases (24.7%). Mixed causes of postpartum hemorrhage included those with DIC, Hyperbilirubinemia, and retained placenta and was seen in total 9 cases.

Table No. 5: Distribution of Cases According to Management of PPH

Intervention	Cases	Percent (%)
Pharmacological	88	98.9
Hematological	80	89.9
Repair under anesthesia	30	33.7
Condom catheterization	18	20.2
B/L uterine artery ligation	12	13.5
B-lynch	10	11.2
Internal Iliac Ligation	4	4.5
Obstetric Hysterectomy (OH)	2	2.2

Majority of the patients were managed by blood transfusion for correcting anaemia, i.e. 80 out of 89 cases (89.9%), also by pharmacological agents 88 cases out of 89 (98.9 %) i.e. with 20-40 units of Pitocin, and other uterotonic drugs like carboprost and methergine, and 18 cases out of 89 cases (20.2%) were managed conservatively with ballon tamponade. Out of 28 surgically managed cases, 4 cases underwent internal iliac ligation, 10 cases underwent B-Lynch compression sutures, and 2 cases underwent obstetric hysterectomy as all other procedures failed. Out of 2 obstetric hysterectomies done, 1 case was of placenta accreta. Among of traumatic PPH, 8 cases underwent vaginal exploration with hematoma drainage, 8 cases underwent cervical tear repair, 5 cases were managed by pressure packing with vaginal pack. Among the cases with mixed PPH that included hyperbilirubinemia, DIC, retained placenta, 18 cases managed conservatively with balloon tamponade and 1 case required obstetric hysterectomy as all other methods failed.

Table No. 6: Distribution of Subjects According to Maternal Complications

Complication	Cases	Percent (%)
No complication	39	43.8
Anemia	36	40.4
vaginal tear or laceration	19	21.3

ICU Management	11	12.4
DIC	8	9
Shock	6	6.7
MODS	5	5.6
Acute renal failure	3	3.4
Bladder injury	2	2.2
OH	2	2.2
Maternal mortality	1	1.1

Most common complication due to PPH in this study was anaemia i.e. 36 out of 89 cases (40.4%). There were no maternal morbidities at the time of discharge. Out of 89 cases, 11 cases admitted in intensive care unit, 11 cases required ventilatory support and 6 cases had prolonged hospital stay. 2 cases had obstetric hysterectomy, 3 case developed acute renal injury requiring dialysis and mortality was observed in 1 case. Mortality was observed in those mothers who were having high risk factors like DIC, hepatic disease, severe anaemia, and abnormal placentation.

DISCUSSION

Managing PPH in rural healthcare settings presents significant challenges, including inadequate access to skilled birth attendants, delays in referral systems, and limited availability of essential resources such as blood transfusion services and uterotonic medications. The cornerstone of PPH prevention lies in the active management of the third stage of labor, which includes the timely administration of uterotonic agents, controlled cord traction, and uterine massage[9]. However, once hemorrhage occurs, swift and aggressive intervention is crucial. Management strategies range from intravenous fluid resuscitation and the administration of tranexamic acid to advanced measures such as uterine tamponade, uterine artery ligation, or hysterectomy in severe cases. The effectiveness of these interventions is largely dependent on the healthcare infrastructure, availability of trained personnel, and access to emergency obstetric care, all of which are often inadequate in rural areas[10].

In the present study majority of the cases, 43 out of 89 cases belonged to age 21 to 25 years accounting to 48.3%. About 29 subjects 32.6% belonged to age 26 to 30 years. Around 12% cases were between age group 31 to 35 years. and only 1 case of age >35 years. The mean age group of my study is 26.16 years. According to study of Rajeshwari et al.[13] around 44.36% subjects belongs to the age between 25 to 30 years. Similarly, in study of Uthpala et al.[14] 44% of the cases belonged to age group 20 to 24 years. According to Ayat Albina et al.[15,] 43% in 26-30 years age group followed by 35% in 21-25 years group.

In India, the burden of PPH is higher among women from lower-income households, rural areas, and socially disadvantaged groups. This disparity can be attributed to a combination of limited access to quality antenatal care, delays in reaching health facilities, lack of skilled birth attendants, and inadequate emergency obstetric services. In our study 74.1% of the cases belonged to lower middle class, 19.1% belonged to lower socioeconomic class (SES). Albina Ayat et al.[15], in their study 84% of the patients belonged to rural areas with low socio-economic status.

In my study majority of cases, 32.6% were primigravidas and around 47 participants i.e. 41.6% were multiparous women. Rajeshwari et al.[13] in their series of 142 cases we have observed that 81 cases were primigravidas and 61 cases were multigravidas and maximum number of cases were in the age group of 25 to 29 years. In the study Yogesh Thawal et al.[16] out of the 80 study population 32 (40%) participants were primigravidas. it was observed that majority of cases delivered at 37 weeks, total 60 out of 89 (67.4%). In present study the mean gestational age was found to be 37 weeks. As per Uthpala et al.[14], gestational age, the majority were from 36-38 weeks and 38-40 weeks respectively both being 30% each. Albina Ayat et al.[15], in their study 89% cases of primary PPH were between 37 to 40 weeks period of gestation.

it was observed that 68.5% were vaginal deliveries and 31.5% were delivered by lower segment c-section. Out of the patients delivered vaginally 29.5% had undergone induction of labour and 6.6% delivered spontaneously. Out of total vaginal deliveries (69 cases) 4.9% had undergone instrumental deliveries leading to traumatic PPH. Spontaneous vaginal delivery is generally associated with the lowest risk of PPH, which

coincides with our study. Sheikh et al.[17] concluded in the study that even in low-risk women, induction of labor regardless of the method used is associated with a high risk of PPH than spontaneous labor. The analysis of study conducted by Albina Ayat et al.[15], among the patients that delivered vaginally, 54 out of 90 were induced so the incidence of development of PPH was 60%. Lastly spontaneous vaginal birth seen in 10 patients out of 90 with incidence of development of PPH to be 11.1%.

Present study maternal anaemia contributes highest to about 29.2% i.e. 26 out of 89 cases, followed by preeclampsia contributing to 23 out of 89 cases 25.8%. Third factor affecting PPH in our study is vaginal laceration or tear 19 cases , followed by abruptio placentae 13 out of 89 cases i.e. 14.6%, followed by 12 cases of prolonged labour (13.5%), 12 cases of precipitate labour 11 cases of precipitate labour, 11 cases of previous LSCS, 8 cases of macrosomia, 8 cases of HELLP syndrome, 9 cases of retained placenta, 7 cases of multiple pregnancy, 6 cases of polyhydramnios, 5 cases of thrombocytopenia, 5 cases of placenta previa, 4 cases of multifetal pregnancy, 3 cases of instrumental delivery, 4 cases of GDM, 3 cases of adherent placenta, and 1 cases of rupture uterus. Uthpala et al.[14] in their study common risk factors severe anaemia (28%), previous LSCS (22%), PIH/ pre-eclampsia (18%), pre-mature rupture of membranes (12%), abruptio placentae (12%) and prolonged labor (8%). Albina Ayat et al.[15], in their study 75.5% of patients developing primary PPH had hemoglobin levels below 9g%. In present study 41 cases had atonic PPH attributing to 46.1 %. Followed by 24.7 % of traumatic PPH. whereas 10.1 % had mixed PPH. In a study conducted by Ashraf et al. uterine atony was found in 34% of cases. The analysis of Albina et al.[15] The main cause of PPH in our study was uterine atony with an incidence of 73% i.e., 146 out of 200 patients developed PPH because of uterine atonicity.

In our study 98.9% cases were managed medically, 89.9 % cases were given blood transfusions 33.7% cases had undergone repair under anaesthesia. 18% cases had condom catheterization and 13.5% cases had undergone bilateral uterine artery ligation, 11.2% cases had been taken compression sutures via B-Lynch, and 4.5% cases had internal iliac ligation whereas 2.2% cases had undergone obstetric hysterectomy. The most common method of management was the use of uterotonics (100%) while the surgical intervention was used in 86% of the cases followed by PCV blood transfusions (82%) in the study of Uthpala et al.[14]

Rajeshwari et al.[13], in their study found that PPH was controlled with uterotonics in 69% of cases and 27% required surgical management like B-Lynch sutures or Hayman sutures and hysterectomy was done in 4 cases. Blood transfusion was done for 26 cases (18%). Sheldon W. et al.[18], observed similar medical and surgical interventions. Authors observed that 44 (55.0%) cases had blood transfusion, 6 (7.5%) cases had platelet transfusion and 2 (5.0%) cases had FFP transfusion.

In the present study 39 cases (43.8%) had zero complications, 36 cases (40.3%) had anaemia, 19 cases (21.3%) had cervical tear/ vaginal or lacerations, 11 cases (12.4%) needed ICU management, 8 cases (9%) had DIC. 6 cases (6.7%) suffered from hypovolemic shock, 5 cases (5.6%) had MODS, 3 cases (3.4%) had acute renal failure, 2 (2.2%) cases underwent obstetric hysterectomy, and bladder injury and 1 patient (1.1%) succumbed to death.

Ravella Sowjanya et al.[19] 56% had anaemia, 5% had AKI, 4% had DIC, 18% had no complications, 9% had other complications like transfusion related complications, sepsis, ventilatory support and use of vasopressors, ARDS and near miss cases, and Mortality was seen in 8% of cases.

Riches J et al.[20], PPH was the cause of 20.4% of maternal deaths. Most deaths from PPH occurred within 24 hours of birth (80.0%), among women who had been referred to a higher- level facility (57.0%) and were admitted in stable condition (60.0%). Vacuum births carried an increased risk of death from PPH (OR 4.25 (95% CI 1.15 to 20.13, p=0.039)). Detailed reviews identified that deaths from PPH were more likely to be associated with factors such as 'lack of obstetric lifesaving skills' (26.7% vs 10.1%, p<0.001), 'inadequate monitoring' (51.5% vs 40.7%, p=0.012) and 'communication problems between facilities' (11.5% vs 6.2%, p=0.019) than deaths from other causes.

CONCLUSIONS

Postpartum hemorrhage continues to be the leading cause of maternal mortality worldwide. Postpartum hemorrhage can be managed effectively by early and timely diagnosis followed by proper monitoring of high-risk cases and active management of third stage of labour with use of uterotonics like oxytocin,

misoprostol, Carboprost and methergine and blood transfusions whenever indicated and skillful surgical while in some cases surgical intervention may be required. If effective measures are taken to ensure good antenatal care is provided to all pregnant women, safe hospital deliveries, creating awareness among rural and tribal people, training of health professionals, proper anticipation and skilled management along with timely referral of high-risk pregnancies from peripheral health care center after initial basic management to tertiary care center where round the clock multidisciplinary team are available for further management.

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