Original Article

Prevalence and Factors Associated with Postpartum Hemorrhage among Women who Delivered at Rwinkwavu District Hospital in the Eastern Province of Rwanda

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Cite as: Nyirijuru A , Renzaho JN, Kidane AA, Ogendi J. Prevalence and Factors Associated with Postpartum Hemorrhage among Women who Delivered at Rwinkwavu District Hospital in the Eastern Province of Rwanda. Rwanda J Med Health Sci. 2024;7(2): 350-358. https://dx.doi.org/10.4314/rjmhs.v7i2.20

Abstract

Background
More than 25% of maternal deaths in low and middle-income countries were due to post-partum hemorrhage (PPH). The PPH is considered as the maternal mortality leading cause worldwide. The aim of this study was to determine the prevalence of postpartum hemorrhage and to identify its associated factors among women who delivered at Rwinkwavu District Hospital in the Eastern Province of Rwanda.

Methods
A facility based cross-sectional study design, was used. Four hundred ten (410) participants were selected systematically. The SPSS version 21 was used for data analysis. Descriptive statistics were used to determine the prevalence of PPH at Rwinkwavu District Hospital. Chi-square test and multivariable logistic regression were used to generate adjusted odds ratios with 95%CI to identify the PPH associated factors. The findings were considered significant for p-value <0.05.

Results
The PPH prevalence was 15.1%. The odds of bleeding in postpartum were 2.411 times [AOR=2.411, 95%CI: 1.027-5.661, p-value=0.043] higher among married women than single ones. Women who delivered by Cesarean section were 3.092 times more likely to bleed in postpartum [AOR=3.092, 95%CI: 1.176-8.128, p<0.001] compared to those who delivered normally. Women whose delivery labors were induced were 25.689 times more likely to suffer from PPH [AOR=25.689, 95%CI: 3.864-45.759, p<0.001] compared to those whose labor was not induced. Women with prolonged labor were 11.391 times more likely to bleed in postpartum [AOR=11.391, 95%CI: 5.011-25.893, p<0.001] compared to those with normal length of delivery labor.

Conclusion
The prevalence of PPH was high, and this is a great public health concern; therefore, the Ministry of Health and health facilities need to strengthen strategies to prevent PPH. Marital status, mode of delivery, labor induction and prolonged labor were significantly associated with PPH.

Rwanda J Med Health Sci 2024;7(2): 350-358

Keywords: Post-partum hemorrhage, pregnant women, prevalence

Introduction

Maternal mortality continues to be a big problem in global health. Around two hundred ninety-five thousand females die every year because of pregnancy and majority of these deaths can be prevented or treated. In Low and Middle-Income Countries (LMICs) maternal death in was 94% ; more than 25% of these were due to post-partum hemorrhage.[1] The PPH is the loss of blood after delivery, which has an adverse effect on the patient's general condition signed by an increase in heart beat rate and a decrease in blood pressure. [2] Approximately fourteen million women lose much blood after delivery and then approximately 70,000 women die globally every year. The PPH is considered as the maternal mortality leading cause worldwide. The PPH and its complications are more likely to occur in mothers who are beyond 20 weeks of gestation.[3]

In Sub-Saharan Africa, Maternal death rate was seen between 500 and 1000/ 100000 births in 2015 compared to approximately 5 to 20 births/100000 in developed countries.[3] The PPH is believed to be a significant factor in 115,000 maternal deaths per year and to be 10.5% of all fatalities in Sub-Saharan Africa every year. [4] PPH is the primary cause of maternal death in Rwanda, which was responsible for 22.7% of all maternal deaths that have been scientifically documented in 2015.[5]
In the industrialized world, PPH is a disorder that is mostly preventable and treatable.[6] In the Philippines, it causes 53% of maternal mortality, 43% in Indonesia, and 59% in Burkina Faso in 2017 and Rwanda was one of the few African nations to accomplish the fifth MDG of lowering maternal death by more than 75% from 1071 in 2000 to 210 per 100,000 live births in 2015.[6]

In 2021, maternal mortality death rate in Rwanda was 259.0 per 100,000 live births. [5] Reducing the proportion of maternal deaths that are attributed to post-partum hemorrhage would, most likely, result in a reduction of a big proportion of maternal deaths in Rwanda; the reduction could also contribute to the realization of Sustainable Development Goal 3.1 calls for reducing maternal mortality to fewer than 70 deaths per 100,000 live births by 2030.[7] Rwanda is committed to accomplishing this goal as a signatory to several UN conventions. Despite complications of delivery such as PPH and its consequences, researches to identify factors associated with PPH are still few. [2] The proposed study bridged this gap by focusing on the prevalence and factors associated with post-partum hemorrhage in a district hospital in Eastern Province of Rwanda.

Methods

Study setting

The study was conducted in Rwinkwavu District Hospital. It is one of the two district hospitals located in Kayonza District, Eastern Province of Rwanda. It covers the South part of Kayonza District while Gahini District Hospital covers the North of the district. It is located in Rwinkwavu Sector and has nine health centers in its catchment area.

Study design

A facility based cross-sectional study design with quantitative approach was used to determine the prevalence and factors associated with PPH in Rwinkwavu District Hospital, Eastern Province of Rwanda. Files were got from the Maternity Ward of the hospital.

Study Population and sample size

The study population were 5,634 women who delivered in the Maternity Ward at Rwinkwavu District Hospital in the Eastern Province of Rwanda during a period of two years, from January 1st, 2021, to December 31st, 2022. The sample size was 410 women and a systematic sampling technique was used to select the files of women from which data were obtained: Considering the registered files and the sample size, the first woman in the register was included and every 13th woman until the sample size of 410 was gathered.

The sample size that was used for this study was obtained from a formula that was developed by Yamane Taro.[8] According to this formula, sample size n is calculated as follows:

$$n=\frac{N}{1+N(e)2},$$

Where:
n is the sample size.
N is total number of populations
e is marginal error
Substituting,

$$n=\frac{5634}{1+5634(0.05)2}$$

Therefore, it was 373 plus an increment of 10% of this sample size to have 410 women.

Data collection instrument and procedure

A newly designed checklist was used to collect data. The checklist was divided into three sections, section A, section B and section C. Section A was on sociodemographic characteristics of the women; section B was on Gynecologic & obstetric Characteristics of women who gave birth and section C was on Delivery related factors. Treatment files of deliveries are kept in hospital registries of Maternity ward. Every case of delivery has information age, year of delivery, in the treatment file. Data collectors gathered information on socio demographic characteristics, diagnosis of PPH and predisposing. Data collectors filled out the checklist based on using Maternity ward's registers from the hospital.

Measurement

To measure the prevalence of PPH among women who delivered at Rwinkwavu District Hospital, descriptive statistics were used in SPSS by calculating the percentage obtained by dividing the number of women who had PPH during delivery by the total number of women who delivered during the period of two years (from January 2021 to December 2022) time a hundred.

Data analysis

Data were entered into IBM SPSS Statistics for Windows version 21.0 (IBM Corps, NY, USA), following which they were analyzed. The PPH prevalence at Rwinkwavu DH was determined by descriptive statistics (frequency and percentages). To establish the factors influencing the PPH, adjusted odd ratios with 95% CI were used. Factors obtained by Chi-square test were sent to multivariable regression to identify factors by interpreting adjusted odds ratios and p-values. The results were considered significant if the p-value was less than 0.05. To present the findings, text, figures, and tables were used in word document.

Ethical considerations

Ethical clearance for this study was sought and obtained from Mount Kenya University Institutional Review Board, REF: MKU04/PGS&R/0946/2023]. The permission of conducting this study was provided by Rwinkwavu District Hospital. No personal identifiers were obtained and only information useful in documenting the prevalence and factors associated with PPH were taken.

Results

Socio-demographic, gyneco-obstetric and delivery related functional characteristics of respondents

Files of a total 410 women who delivered in the hospital during the study period were reviewed. The ages ranged from 15 years to 47 years. Table 1 presents socio-demographic, gyneco-obstetric and delivery functional characteristics of the women who delivered at the hospital. Slightly more than half, 209(51%) were in the age bracket of 26-36 years. Those in the age brackets of 37-47 years and 15-25 followed with proportions 106(25.9%) and 95(22.9%) respectively. A slight majority, 225(54.9%) were protestants; Catholics were 172(42%).

The majority, 268(65.4%) were married. An overwhelming majority, 406(99%) were reported to be farmers. The majority, 337(82.2%) of the women were multigravida. Many of them, 295(82%) delivered by Cesarean section.

Table 1. Socio-demographics, gyneco-obstetric and delivery related functional characteristics of participants

Variables	Frequency (n=410)	Percentage (%)
Age [in years]		
15-25	94	22.9
26-36	209	51.0
37-47	106	25.9
48+	1	0.2
Religion		
Catholic	172	42.0
Islam	13	3.1
Protestant	225	54.9
Marital status		
Single	142	34.6
Married	268	65.4
Occupation		
Unemployed	1	0.3
Employed	3	0.7
Farmer	406	99.0
Level of education		
No education	11	2.7
Primary	350	85.3
Secondary	49	12.0
Gravida		
Primigravida	73	17.8
Multigravida	337	82.2
Mode of delivery		
Normal delivery	115	28.0
Cesarean section	295	72.0
Multiple pregnancy		
Yes	6	1.5
No	404	98.5
History of previous PPH		
Yes	11	2.7
No	399	97.3
History of Hypertensive Disorder		
Yes	2	0.5
No	408	99.5
Preeclampsia		
Yes	21	5.1
No	389	94.9
Macrosomia		
Yes	4	1.0
No	406	99.0
Delivery with episiotomy		
Yes	38	9.3
No	372	90.7
Use of oxytocin		
Yes	407	99.3
No	3	0.7
Labor induction		
Yes	20	4.9
No	390	95.1
Prolonged labor		
Yes	39	9.5
No	371	95.5
Retained products of conception		
Yes	4	1.0
No	406	99.0

A big number, 404 (98.5%) of women did not have multiple pregnancies. Most of sampled women, 399(97.3%) did not have history of PPH. A lot of women 408(99.5%) did not have disorder of hypertension in the past. Only few women experienced preeclampsia, 22 (5.1%) and macrosomia, 4(0.1%).

The findings that a big number, 372(90.7%) of women did not deliver by episiotomy. Only three (0.7%) of these women were not given oxytocin directly after delivery. The majority, 390(95.1%) of women who delivered were not given medicines to induce the labor, 371(90.5%) of them did not experience the prolongation of labors and 406(99.0%) did not have any products of conception retained in the uterus.

Prevalence of PPH at Rwinkwavu DH

As shown in Table 2, the prevalence of PPH was estimated to be 15.1% obtained by comparing the number of women who gave birth and experienced PPH (62) to the total sample (410). By disaggregating the prevalence according to socio-demographic characteristics of women, the PPH was more prevalent among aged 26-36 years (50.0%) than other age categories, among married women (79.0%) compared to other marital statuses, more prevalent among catholic (51.6%) than other religions, more prevalent among women who completed primary education (88.7%) than other levels of education. According to occupation, all women with PPH were found to be farmers (100%).

Factors associated with postpartum hemorrhage

Variables	Frequency	Percentage
Postpartum hemorrhage		
Yes	62	15.1
No	348	84.9
Postpartum hemorrhage prevalence by age of the women (n=62)		
15-25	15	24.2
26-36	31	50.0
37-47	16	25.8
48+	0	0.0
Postpartum hemorrhage prevalence by marital status (n=62)		
Single	13	21.0
Married	49	79.0
Postpartum hemorrhage prevalence by religion (n=62)		
Catholic	32	51.6
Islam	3	4.8
Protestant	27	43.6
Postpartum hemorrhage prevalence by occupation of the woman (n=62)		
Unemployed	0	0.0
Employed	0	0.0
Farmer	62	100.0
Postpartum hemorrhage prevalence by level of education of the woman (n=62)		
No education	1	1.6
Primary	55	88.7
Secondary	6	9.7

Bivariate analysis of factors associated with postpartum hemorrhage

Table 3. Bivariate analysis of factors associated with PPH among women who delivered at Rwinkwavu District Hospital

Variables	Postpartum Hemorrhage (n=410) Yes n(%)	No n(%)	Chi-Square	P-Value
Age [in years]			0.243	0.970
15-25	15(16.0)	79(84.0)		
26-36	31(14.8)	178(85.2)		
37-47	16(15.1)	90(84.9)		
48+	0(0.0)	1(100.0)		
Religion			3.975	0.137
Catholic	32(18.5)	140(81.4)		
Islam	3(23.1)	10(76.9)		
Protestant	27(12.0)	198(88.0)		
Marital status			6.026	0.014
Single	13(9.2)	129(90.8)		
Male	49(18.3)	219(81.7)		
Occupation			0.720	0.698
Unemployed	0(0.00)	1(100.0)		
Employed	0(0.00)	1(100.0)		
Farmer	62(15.1)	348(84.9)		
Education			0.723	0.696
No education	1(9.1)	10(90.9)		
Primary	55(15.7)	295(84.3)		
Secondary	6(12.2)	43(87.8)		
Gravida			0.499	0.480
Primigravida	13(17.8)	60(82.2)		
Multigravida	49(14.5)	288(85.5)		
Mode of delivery			6.628	0.010
Normal delivery	9(7.8)	106(92.2)		
Cesarean section	53(18.0)	242(82.0)		
Multiple pregnancy			0.011	0.915
Yes	1(16.7)	5(83.3)		
No	61(15.1)	343(84.9)		
History of previous PPH			0.082	0.774
Yes	2(18.2)	9(81.8)		
No	60(15.0)	339(85.0)		
History of Hypertensive Disorder			0.358	0.550
Yes	0(0.0)	2(100.0)		
No	62(15.2)	346(84.8)		
Preeclampsia			0.012	0.913
Yes	3(14.3)	18(85.7)		
No	59(15.2)	330(84.8)		
Macrosomia			0.720	0.396
Yes	0(0.0)	4(100.0)		
No	62(15.3)	344(84.7)		
Delivery with episiotomy			0.355	0.551
Yes	7(18.4)	31(81.6)		
No	55(14.8)	317(85.2)		
Use of oxytocin			0.781	0.377
Yes	61(15.0)	346(85.0)		
No	1(33.3)	2(66.7)		
Labor induction			104.520	<0.001
Yes	19(95.0)	1(5.0)		
No	43(11.0)	347(89.0)		
Prolonged labor			64.574	<0.001
Yes	23(59.0)	16(41.0)		
No	39(10.5)	332(89.5)		
Retained products of conception			0.307	0.579
Yes	1(25.0)	3(75.0)		
No	61(15.0)	345(85.0)		

The study findings in Table 3 revealed that the marital status of the women (p=0.014) was significantly associated with PPH among them. The mode of delivery (p=0.010) was significantly associated with PPH among women in Rwinkwavu DH. Labor induction (p<0.001) and prolonged labor (p<0.001) were significantly associated with PPH.

Multivariable analysis of factors associated with PPH

The findings in Table 4 revealed that the odds of bleeding in postpartum were 2.411 times [AOR=2.411, 95%CI: 1.027-5.661, p-value=0.043] higher among married women than single ones. Women who delivered by Cesarean section were 3.092 times more likely to bleed in postpartum [AOR=3.092, 95%CI: 1.176-8.128, p<0.001] compared to those who normally delivered. Women whose delivery labors were induced were 25.689 times more likely to suffer from PPH [AOR=25.689, 95%CI: 3.864-45.759, p<0.001] compared to those whose labors were induced. Women with prolonged labor were 11.391 times more likely to bleed in postpartum [AOR=11.391, 95%CI: 5.011-25.893, p<0.001] compared to those with normal length of delivery labor

Table 4. Multivariable logistic regression analysis of factors associated with PPH among women who delivered at Rwinkwavu DH

Variables	AOR	95%CI		P-Value
		Lower	Upper	
Marital status				
Married	2.411	1.027	5.661	0.043
Single	Reference			
Mode of delivery				
Cesarean section	3.092	1.176	8.128	0.022
Normal delivery	Reference			
Labor induction				
Yes	25.689	3.864	45.759	<0.001
No	Reference			
Prolonged labor				
Yes	11.391	5.011	25.893	<0.001
No	Reference			

AOR=Adjusted Odds Ratio, CI: Confidence Interval

Discussion

The objectives of this study were to determine the PPH prevalence among women who delivered at Rwinkwavu DH and identify its associated factors.

The results revealed that PPH was prevalent at 15.1%. The postpartum prevalence of the present study was high compared to the rates in a study done in Japan[9] and Uganda[10] that stood at 13% and 9% respectively. This rate still high compared to the prevalence of PPH around the world that stood at 6%.[2] The prevalence of PPH in the present study was lower than the rates estimated for studies conducted in Uganda,[11] Ethiopia,[9] and Northern Province of Rwanda showing 25.7%, 16.6%, and 25.1% respectively. This indicates gaps in reproductive health services delivery at different levels from the community to health facilities. Enhancing preventives measures at all levels, trainings and mass messages to respectively target health care providers and community members during different gatherings. This study showed that marital status, mode of delivery, labor induction and prolonged labor were significantly associated with PPH in this hospital.

Married women were more likely to experience PPH than singles ones. This finding is in line with the results of previous studies conducted in Uganda[10] and Ethiopia.[9] This is explained by a big number of women who came for delivery were married. This will imply the involvement of men in antenatal care visits and follow up of the women in postpartum at home as men can follow their spouses to check any vaginal bleeding at home after being discharged by the hospital.

Women who delivered by cesarean section were more likely to bleed in postpartum than those who delivered normally. This finding was also found in a systematic review done in Africa[4] and in results of a systematic review and meta-analysis study conducted in Ethiopia[2] and in findings of a case control study conducted in China.[12] This indicates gaps in minimizing bleeding when doctors perform Cesarean Sections and most commonly, because they are practices by general practitioners; only one gynecologist is deployed in district hospital and cannot cover them. The Ministry of Health, through the Rwanda Biomedical Center is recommended to deploy more gynecologists in remote hospitals.

Women who were induced to give birth were more likely to bleed in postpartum than those whose labor was not induced. This result was similar to the results of a systematic review done in Africa.[4] Medicines that are used to induce the labor increase uterine contractions and these may cause uterus rupture and bleeding after delivery. This will reflect on the presence of a single gynecologist in the hospital to make appropriate decision to induce pregnancies. The training of general practitioners, midwives and nurses who work in maternity ward to support the specialist in managing deliveries both normal and dystocia.

Compared women with normal length of delivery labor, women with prolonged labor more likely to bleed in postpartum. This result is similar to the results of a study conducted in Ethiopia.[9]

For the prolonged labor, uterine contractions are not strong enough and blood vessels bleed freely towards hemorrhage. This implies supervision of health care providers (nurses & midwives) from health centers in the catchment by the hospital staff focusing on the quick referral of pregnant women without delaying to reach the hospital. This supervision targets also community health workers in charge of maternal and newborn health in villages of the catchment area to always remind women about the confinement dates and accompany them to the health center considering appointments ordered by midwives and nurses.

Conclusion

The aim of this study was to determine the prevalence and factors associated with PPH among women who delivered in Maternity Ward at Rwinkwavu DH. The prevalence of PPH is high and this may be due to numerous induced labor, prolonged labor and more cesarean sections in the hospital. The factors associated with PPH were marital status, mode of delivery, labor induction and prolonged labor. The study was limited in two ways; the findings of one hospital cannot be generalized to whole country, and it did not consider home deliveries in catchment area of the hospital where it was conducted.

Conflict of interest

We declare that we have no conflict of interest.

Authors' contribution

AN designed the study, led the data collection, cleaned, analyzed and interpreted the data. AN, JNR, AK & JO contributed to the conception, development of the manuscript and working on reviewers' comments until its publication.

Funding
This study did not receive any kind of monetary grant.

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