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Primary Post-Partum Haemorrhage Following Vaginal Deliveries at the Douala General Hospital: Prevalence, Causes and Risk Factors

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Abstract

Background: Postpartum haemorrhage is one of the leading causes of maternal morbidity and mortality worldwide. It occurs predominantly in developing countries due to poorly developed infrastructures and lack of skilled birth attendants. **Objective:** To identify the prevalence, causes and risk factors of primary postpartum haemorrhage following vaginal deliveries in a referral hospital (Douala General Hospital-Cameroon). **Methods:** This was a descriptive and analytical study carried in the Douala General Hospital (DGH) for which socio-demographic, clinical, obstetric and post-partum data were collected using a pre-tested questionnaire. Descriptive statistics, multivariate analysis and logistic regression allowed us to present and discuss our results, with a 95% confidence interval (CI) and p value < 0.05. **Results:** The prevalence of Primary Postpartum Haemorrhage was 1.33%. Quantification of bleeding was reported in only 13.15% of cases. The main causes were: uterine atony (36.18%), placental retention (25.65%), cervical tears (12.50%), perineal tears (10.52%) and cervico-vaginal tears (08.52%). The risk factors were: age between 19 - 35 years aOR = 4.52; 95% CI = 2.65 - 7.98; p = 0.021); unemployment (aOR = 4.74; 95% CI = 2.91 - 6.02; p = 0.001); being multigravida (aOR = 9.21; 95% CI = 6.43 - 12.48; p = 0.035); history of abortion (aOR = 5.11; 95% CI = 2.05 - 7.29; p = 0.004); preterm delivery (aOR = 6.88; 95% CI = 2.72 - 9.06; p = 0.002); duration of labour > 12 hours (aOR = 4.05; 95% CI = 2.46 - 7.98; p = 0.003) and macrosomia (aOR = 3.27; 95% CI = 1.03 - 5.68; p = 0.041). **Conclusion:** Primary postpartum haemorrhage remains a poorly assessed obstetric complication in the maternity ward of the Douala

General Hospital (DGH); Training staff on quantifying postpartum blood loss and monitoring the second and third stages of labour can help to better manage and reduce its occurrence.

Keywords

Primary Postpartum Haemorrhage, Prevalence, Causes, Risk Factors

1. Introduction

The World Health Organization (WHO) defines Primary Postpartum Haemorrhage (PPH) as blood loss of at least 500 ml occurring within 24 hours of childbirth [1]. Postpartum haemorrhage is a combination of bleeding from delivery and haemorrhage from the birth canal. It concerns 5% of deliveries [2]. PPH is the leading cause of maternal mortality in low-income countries and the leading cause of nearly one in four maternal deaths worldwide [1]. In 2015, according to the WHO, around 830 women died every day around the world due to complications related to pregnancy or childbirth and nearly 300,000 women died during pregnancy, childbirth or in the days that followed [3]. Despite the progress made in the management of PPH, it remains an important factor in maternal morbidity and mortality, in both developing and developed countries [4] [5]. In Cameroon, the maternal mortality rate increased from 484 deaths in 1998, to 669 deaths in 2004, then to 690 deaths in 2010 and to 789 deaths in 2014 per 100,000 live births, the main cause of which was PPH secondary to uterine atony [6] [7] and [8]. The high death rates, despite the management policies in place, illustrate the public health problem of PPH in our context. We designed this study with the aim of appreciating the magnitude of the problem at the Douala General Hospital (DGH), which is a tertiary level health facility that must provide quality care, in order to identify efficient corrective measures.

2. Methods

2.1. Study Design and Site

This was a descriptive and case-control study of all vaginal deliveries complicated by primary postpartum haemorrhage (PPH) that occurred between January 1, 2009 and December 31, 2018 in the obstetrics department of the DGH. The DGH is one of the tertiary level referral hospitals in Cameroon, which has a capacity of 320 beds distributed in different departments and units. The Gynaecology and obstetrics department has an operating theatre, a maternity ward and hospitalisation wards coordinated by obstetricians and gynaecologists, and midwives. Obstetric emergencies like PPH are managed following guidelines developed by the administration of the service.

2.2. Inclusion Criteria

Cases were files of patients who delivered at a gestational age of 28 weeks and

more, and had post partum blood loss in excess of 500 ml when blood loss was quantified or any those with hemodynamic instability, pre-shock, or hypovolemic shock due to profuse bleeding.

Controls were constituted by files of women who had vaginal delivery with no post partum haemorrhage within the first 24 hours following delivery.

Cases and controls were matched for age in years, the year and month of occurrence of PPH. We matched 1 case to 3 controls.

2.3. Exclusion Criteria

We excluded:

- All files with less than 25% of required information;
- Cases of caesarean section and;
- Secondary post partum haemorrhage, occurring more than 24 hours after delivery.

2.4. Sample Size

We used a consecutive and convenience sampling. The minimum sample size was calculated from Schesselman's formula [9].

$$n = \left(\frac{r+1}{r}\right)\frac{(p)(1-p)(z\partial + z\beta)^2}{(p_1 - p_2)^2}$$

n = minimum sample size;

r = case/control ratio (number of controls is equal to 03 times the number of cases) = 1/3;

P_1 = proportion of the main factor in the group of cases [10];

P_2 = proportion of the main factor in the control group [10];

$P = (p_1 + p_2)/2$ = mean of the proportions;

$P_1 - p_2$ = difference in proportions;

$Z\alpha$ = standardized level of significance = 1.96;

$Z\beta$ = standardized power = 0.84;

$$n = \left(\frac{\frac{1}{3}+1}{\frac{1}{3}}\right)\frac{(0.366)(1-0.366)(1.96+0.84)}{(0.134-0.5)^2} = 85.683 \approx 86$$

n = 86 cases for 258 controls or a total of 344 files with 1 case for 3 controls.

2.5. Data Processing and Analysis

Childbirth registers, hospitalization records and medical records were used to collect the data. The socio-demographic variables, the clinical profile and the characteristics related to pregnancy and childbirth were analysed with the SPSS 20.0 software. The odds ratio (OR) at 95% confidence interval (CI) allowed to measure the association between the dependent and independent qualitative variables. The logistic regression eliminated the confounding factors and the error threshold p was set at 0.05.

2.6. Ethical Considerations

Ethical clearance was obtained from the ethics committee of the Université des Montagnes. Authorization was obtained from the administration of the Douala General Hospital. The principles of research ethics were observed during the study.

3. Results

We compiled a number of 163 cases of PPH but only 152 were included in the study; 4 files had incomplete data and 7 were not found. Controls were constituted by 456 files.

3.1. Prevalence of Post-Partum Haemorrhage

We recruited 12,240 deliveries during our study period with 163 cases of PPH, giving a prevalence of 1.33%. Eleven files were excluded: 04 with incomplete data and 07 not found. We worked on a total of 608 files, 152 for the cases and 456 for the controls.

3.2. Causes of Post-Partum Haemorrhage

The quantification of bleeding was mentioned in 20/152 files, (13.15%). The remaining (86.5%) was clinical and visual assessment.

As shown in Table 1, the causes of PPH at DGH were classified in two groups: haemorrhage during delivery which occurred in 95 cases (62.50%) of which uterine atony represented 55 cases (36.18%) and placental retention which occurred in 39 cases (25.65%) and uterine inversion 1 case (0.65%); the second group was genital tract lacerations which occurred in 57 cases (37.50%) among which: 19 cases (12.50%) of cervical tears, 16 cases (10.52%) of perineal tears, 13 cases (8.55%) of cervico-vaginal tears, 7 cases of uterine rupture (4.60%) and 2 cases of perineal and pelvic haematomas (1.31%).

Table 1. Distribution of cases according to the aetiology of postpartum haemorrhage.

Sites	Causes	Frequency (n)	Percentage (%)
Haemorrhage during delivery	Uterineatony	55	36.18
	Placental retention	39	25.65
	Uterine inversion	01	0.65
			62.50
Genital tractlaceratons	Cervical tears	19	12.5
	Perineal tears	16	10.52
	Cervico-vaginal tears	13	08.55
	Uterine rupture	07	04.60
	Perineal and pelvic hematomas	02	01.31
			37.50
	TOTAL	**152**	**100.00**

3.3. Risk Factors

- Sociodemographic characteristics related to postpartum haemorrhage (Table 2).

The mean age of the 152 participants with PPH was 22.4 ± 4.07 years. 63.82% of them were aged between 19 to 35 years. This age group increased the risk of PPH by 3.49 with a significant difference. On the other hand, the age group of less than 19 years multiplied the risk of PPH by 2.7 with a non-significant difference. Being single increased the risk of PPH by 4.36 times with a significant difference. Unemployment increased the risk of PPH by 2.9 times with a significant difference. There was no significant difference regarding religion.

The personal past histories of the participants revealed that (Table 3): Being multigravida increased the risk of PPH by 6.45 times with a significant difference. Being primiparous increased the risk of PPH by 1.21 with a significant difference. The history of PPH and abortion increased the risk of PPH by 6.97 and 3.56, respectively, with significant differences. There was no significant difference between the two groups for medical and surgical past histories. Self-medication with traditional oxytocin-like drugs increased the risk of PPH by 2.27 times with a significant difference.

The characteristics of pregnancy and childbirth (Table 4) revealed that there is no association between the occurrence of PPH and the attendance or not to ANC; preterm delivery (28 - 36 weeks + 6 days) increased the risk of PPH by 4 with a significant difference. Induction of labour and stimulation were not associated with PPH. The duration of labour (>12 h) multiplied the risk of PPH by 3.11 with a significant difference. Newborns with a birth weight over 4000 g had a 4.38-fold increase in risk of PPH with a significant difference.

Table 2. Distribution of cases and controls according to socio-demographic variables.

Variables	Cases (N = 152) n (%)	Controls (N = 456) n (%)	OR (CI 95%)	*p*-value
Age (years)				
<19	20 (13.16)	66 (14.47)	2.70 (1.59 - 5.79)	0.13
19 - 35	97 (63.82)	296 (64.91)	**3.49 (2.00 - 5.21)**	**0.04**
>35	35 (23.02)	108 (23.68)	0.99 (0.69 - 1.73)	0.77
Marital status				
Single	60 (39.47)	282 (61.84)	**4.36 (2.73 - 6.22)**	**<0.01**
Married/cohabitation	92 (60.53)	188 (41.22)	0.59 (0.16 - 2.18)	0.62
Profession				
Employed	51 (33.56)	114 (25.00)	4.41 (3.32 - 6.65)	0.23
Unemployed	101 (66.44)	356 (78.00)	**2.90 (1.32 - 4.72)**	**<0.01**
Religion				
Christian	108 (71.06)	310 (67.98)	0.52 (0.36 - 0.75)	<0.01
Muslim	26 (17.10)	117 (25.65)	0.41 (0.24 - 0.69)	<0.01
Jehovahwitness	18 (11.84)	43 (09.42)	2.64 (3.79 - 8.46)	0.19

Table 3. Distribution of cases and controls according to personal history.

Variables	Cases N = 152 n (%)	Controls N = 456 n (%)	OR (CI = 95%)	*p*-value
Gravidity				
Multigravida	74 (48.68)	227 (49.78)	**6.45 (5.27 - 8.02)**	**0.04**
Paucigravida	52 (34.21)	140 (30.70)	0.59 (0.41 - 0.85)	<0.01
Primigravida	26 (17.11)	103 (22.58)	0.46 (0.28 - 0.76)	<0.01
Parity				
Multipara	66 (43.42)	236 (51.75)	1.36 (0.01 - 3.84)	0.65
Paucipara	50 (32.89)	129 (28.28)	1.25 (0.74 - 1.47)	0.03
Primipara	36 (23.68)	105 (23.02)	**1.21 (0.87 - 1.70)**	**<0.01**
Obstetric and gynaecological history				
History of abortion	69 (45.39)	115 (25.21)	**3.56 (2.75 - 5.76)**	**<0.01**
History of PPH	1 (0.66)	7 (01.53)	6.97 (4.60 - 9.20)	0.24
History of hypertension	03 (1.97)	34 (07.45)	0.08 (0.01 - 0.62)	<0.01
History of caesarian section	20 (13.16)	111 (24.34)	0,49 (0.29 - 0.82)	<0.01
Myomectomy	1 (0.66)	26 (05.70)	0.11 (0.01 - 0.84)	<0.01
Drug history				
Traditional uterotonics	03 (1.97)	13 (02.85)	**2.27 (1.40 - 3.69)**	**<0.01**

*Paucipara here represents women with 2 to 3 deliveries; *Multipara are women with 4 deliveries and more.

Table 4. Characteristics of pregnancy and delivery of cases and controls.

Variables	Cases N = 152 n (%)	Controls N = 456 n (%)	OR (CI 95%)	*p*-value
ANC follow-up (Number of ANC)				
None	15 (9.87)	27 (05.92)	0.95 (0.70 - 1.30)	0.85
Between 1 and 4	100 (65.79)	327 (71.71)	1.06 (0.51 - 3.94)	<0.01
Greater than 4	37 (24.34)	116 (25.43)	1.051 (0.74 - 1.47)	0.83
Gestational age (Weeks)				
28 - 36	20 (13.16)	96 (21.05)	**4.5 (1.61 - 7.16)**	**0.02**
37 - 42	127 (83.55)	303 (66.44)	1.68 (0.14 - 5.65)	0.13
Greater than 42	5 (3.29)	71 (15.57)	8.28 (5.3 - 8.51)	0.42
Augmentation of labour Yes	67 (44.08)	126 (27.63)	0.46 (0.31 - 0.67)	<0.01
Induction of labour Yes	02 (1.32)	11 (02.41)	0.59 (0.16 - 2.18)	0.62
Instrumental extraction Yes	3 (1.97)	9 (01.97)	1.03 (0.27 - 3.85)	0.46
Duration of labour (hours)				
≤12	140 (86.85)	264 (57.89)	0.25 (1.05 - 1.45)	0.12
>12	12 (7.89)	206 (45.17)	**3.11 (2.06 - 6.43)**	**0.02**

Continued

AMTSL Yes	152 (100)	450 (98.68)	**0.64 (1.05 - 2.45)**	**<0.01**
Episiotomy Yes	32 (21.05)	108 (23.68)	0.89 (0.57 - 1.39)	0.31
Birthweigth (grams)				
2500 - 4000	111 (73.03)	287 (62.93)	0.14 (0.09 - 0.21)	<0.01
<2500	13 (8.55)	120 (26.31)	0.87 (0.16 - 2.18)	<0.01
>4000	28 (18.42)	63 (13.81)	**4.38 (2.70 - 7.27)**	**0.03**
Multiple gestation	15 (9.87)	74 (16.22)	0.17 (0.06 - 1.18)	0.32
Hydramnios	02 (0.00)	05 (01.09)	2.24 (0.09 - 1.21)	0.50
Myomas in pregnancy	00 (0.00)	02 (00.43)	0.76 (0.09 - 2.21)	0.42

The most significant factors after multivariate analysis (Table 5) were: age (19 - 35 years), absence of employment, being multigravida, history of abortion, gestational age between 28 - 36 weeks, duration of labour > 12 hours and birth weight > 4000 g.

As shown in Table 5, age group of 19 - 35 years, unemployment, multigravidity, history of previous abortion, prematurity, prolonged labour and macrosomia were associated to increased risks of PPH in multivariate analysis.

4. Discussion

Prevalence: Our prevalence is lower than those found by other authors in Africa, Europe and South America [11] [12], and [13]. This could be explained by the use of visual (and not quantitative) estimation of the blood loss that we found in 85.5% of cases, a source of error linked to the underestimation of cases of PPH not associated with hemodynamic instability. Stafford *et al.* [14] indicated that a visual assessment underestimates the loss of abundant blood after childbirth. This underestimation could explain the delay in intervention strategies [15].

Causes of Primary Postpartum Haemorrhage. Bleeding from deliveryaccounted for 62.50% of the aetiologies. Bleeding from delivery remains a major public health problem in Sub Saharan Africa, where it is the leading cause of maternal mortality [16] [17]. The systematic practice of active management of the third stage of labour (AMTSL) may help reduce its frequency: Univariate analysis has identified AMTSL as a protective factor in PPH; however, we did not find it after linear regression. Trauma to the genital tract came second with 38.38% of cases and could possibly be explained by ineffective monitoring of the second and third stages of labour.

Risk factors: The age range between 19 and 35 was a risk factor. It corresponds to the period when genital activity is the most intense. This result is consistent with those of some authors in Africa and America [18] [19], and [20]. However, Tsu *et al.* in Zimbabwe and Henri *et al.* in Cameroon had found age above 35 years and age below 20 years respectively as risk factors for postpartum haemorrhage [21] [22]. Unemployment increased the risk of PPH 4.74 times: Thomas

Table 5. Multivariate analysis.

Variables	aOR	(CI 95%)	*p*-value
19 - 35 years	4.52	(2.65 - 7.98)	**0.021**
Single	2.18	(1.34 - 5.33)	0.317
Unemployed	4.74	(2.91 - 6.02)	**0.001**
Multigravida	9.21	(6.43 - 12.38)	**0.035**
Primiparity	3.02	(0.25 - 3.39)	0.162
History of abortion	5.11	(2.05 - 7.29)	**0.004**
Traditional uterotonics	3.27	(2.01 - 6.91)	0.081
Number of ANC (1 - 4)	2.41	(1.19 - 4.40)	0.579
Gestational age (28 - 36 Weeks)	6.88	(2.72 - 9.06)	**0.002**
Duration of labour (>12 h)	4.05	(2.46 - 7.98)	**0.003**
Birth weigth (>4000 g)	3.27	(1.03 - 5.68)	**0.041**

aOR: adjusted Odds Ratio.

et al. also found this factor to be associated with PPH in Sudan [18]. We can hypothesize that the absence of a job decreases their purchasing power, hence the absence/irregularity of antenatal consultations (ANC), or even the inability to pay the costs of the ANC-related check-ups. Being a multigravida has also been reported in Africa and South America as a risk factor for postpartum haemorrhage [5] [18], and [23]. This could be explained by an incomplete coverage of family planning activities for the spacing of pregnancies [24]. A history of previous abortion was found by Obossou *et al.* in Benin and Henri *et al.* in Cameroon [22]. In our study, the use of the curette was found in 72.4% of patients: destruction of the uterine mucosa by the curette can lead to partial adhesion or incomplete detachment of the placenta, thereby exposing to postpartum haemorrhage [25]. We agreed with other authors that preterm delivery was a risk factor for postpartum haemorrhage [26] [27], and [28]. Prematurity is highly susceptible to lead to retention of the placenta, complicated by bleeding at delivery [29]. Labour lasting more than 12h was associated with postpartum haemorrhage. Several studies had reached the same conclusion [19] [21] [30], and [31]. An abnormally long duration of labour increases the risk of uterine atony. Birth weight greater than 4000 g was a risk factor for postpartum haemorrhage in our study. A few authors had also found this association [5] [23], and [32]. This could be explained by the overstretching of the uterus induced by the volume of the foetus, thus promoting uterine atony after childbirth.

5. Conclusion

The prevalence of primary postpartum haemorrhage at the DGH is believed to be lower due to the predominantly visual estimate of postpartum bleeding. Enhancing the capacity of maternity staff at the HGD on quantifying postpartum bleeding, monitoring the second and third phase of labour and taking into ac-

count the risk factors identified will help to better assess and reduce the prevalence of PPH.

Study Limitations

This study was a retrospective study with the weakness of poor data recording. Besides blood loss was not quantified in the vast majority of cases and when it was, visual estimation used, this is a potential source of error due to underestimation of blood loss and thus a bias on the real prevalence of PPH.

Authors' Contribution

T. Nana Njamen, R. Tchounzou, F. Nkwele Mangala designed the manuscript, participated in recruitment and wrote the manuscript. All the other authors participated in manuscript revision. All the authors read and approved the final version of the manuscript.

Conflicts of Interest

All authors of this manuscript declare no competing interests.

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