

Early Identification of Risk Factors for Primary Postpartum Hemorrhage at Admission

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Abstract

Background: Postpartum hemorrhage (PPH) is the world's leading cause of maternal mortality, accounting for one-third of all maternal deaths worldwide. **Aim of the Study** was early identification of risk factors of primary postpartum hemorrhage. **Research Design:** A descriptive cross-sectional research design was utilized. **Subject and setting:** The study was carried out over a period of six months in obstetrics and gynecology department at Minia University Hospital for Obstetric and Pediatric. **Tools for Data Collection:** two tools were used; Tool I: Socio-demographic characteristics, and Tool II: Risk factors assessment tools. **Results:** The study revealed that, study group had low risk factors of current PPH had (previous uterine incision, History of PPH), moderate risk factors of current PPH in women had (prior cesarean birth or prior uterine incision, History of one previous PP), high risk factors of current PPH in women (had two or more moderate symptoms of risk factors, platelets level $<100,000/\text{mm}^3$, hematocrit level <30 , placenta previa and suspected placenta accretes) with statistically significance differences. **Conclusion:** previous uterine incision, previous PPH, abnormality in platelet level, hematocrit level and coagulopathy were the most significant risk factors for primary PPH. **Recommendation:** Encourage regular antenatal visit to early detection of risk factors of PPH, and providing the women health education about PPH risk factors.

Keywords: Postpartum, Pregnant women, Primary postpartum hemorrhage, Risk factors

Introduction

Postpartum hemorrhage (PPH) is the world's leading cause of maternal mortality, accounting for one-third of all maternal deaths worldwide. PPH causes up to 60% of all maternal deaths in developing countries. The majority of these deaths occur within 4 hours of delivery, indicating they are a consequence of events in the third stage of labor (Murakami et al., 2015).

Postpartum hemorrhage remains an important cause of premature mortality of women worldwide; an estimated 500,000 women die from this cause every year with up to quarter deaths occur due to hemorrhage. Post-Partum hemorrhage may occur in 1-5% of deliveries in developed as well as in developing countries and it is still most common cause of maternal morbidity and mortality (Gul & Jabeen, 2018).

Postpartum hemorrhage is an obstetrical emergency that takes place following cesarean or vaginal delivery. Prevention can be achieved through timely diagnosis, provision of essential resources and equipment, and correct management of the third stage of labor. PPH can be classified into two categories: primary and secondary PPH. Primary PPH (early PPH) takes place within the first 24 hours following delivery, whereas secondary or delayed PPH transpires after 24 hours to 12 weeks following delivery (Jabbar, Perveen & Kumari, 2019).

Risk factors for postpartum hemorrhage include a prolonged third stage of labor, multiple delivery, episiotomy, fetal macrosomia, and history of postpartum hemorrhage. However, postpartum hemorrhage also occurs in women with no risk factors, so physicians must be prepared to manage this condition at every delivery. Strategies for minimizing the effects of postpartum hemorrhage include identifying and correcting anemia before delivery, being aware of the mother's beliefs about blood transfusions, and eliminating routine episiotomy.

Reexamination of the patient's vital signs and vaginal flow before leaving the delivery area may help detect slow, steady bleeding (Ononge et al., 2016).

Early assessment and aggressive treatment of PPH are important for reducing morbidity and mortality rates. A critical first step in managing persistent PPH is rapid recognition that clinically significant bleeding (unresponsive to initial measures) has occurred, with effective communication of the situation to the appropriate team members, both clinical and laboratory staff. Subsequent measures include immediate resuscitation with definitive action to arrest the bleeding (obstetric, surgical, and/or hematologic) and ongoing assessment and monitoring of the response to treatment. Persistent severe PPH requires early involvement of the most experienced members of the team (Nyflot et al., 2017).

Nursing care during postpartum period is multifaceted requiring knowledge of normal physiologic process as well as potential risks. Anticipatory guidance during postpartum period can have a significant impact on postnatal outcomes. So, the nurse must work toward providing care and education that facilitate holistic family wellness. As well as complete assessment and obstetric history are very important, this might include medical history as; history of medical disease, routine medications and allergies, obstetric history as; gravid, parity, history of postpartum hemorrhage, history of complications during pregnancy, time and mode of delivery, presence of tears or lacerations during delivery, and anesthesia or medications, infant status as; breast or bottle feeding (Downey, Kruse, & Plonczynski, 2019).

Significance of the study

According to the study done by Mohamed, (2018) who investigated the maternity outcome of primary postpartum hemorrhage case in El-Minia maternity Hospital 2016-2017: 2 years study reported that the incidence of primary postpartum hemorrhage (PPH) was 1.88 % in 2016 and 189

cases (1.69%) in 2017 in El-Minia University Maternity Hospital. (Mohamed, 2018).

Postpartum hemorrhage (PPH) is a major cause of maternal mortality and severe morbidity all over the world. The World Health Organization (WHO) estimates that, PPH is a cause of approximately 25% of maternal deaths recently; the industrialized countries have witnessed a slow but steady escalation in the incidence of PPH. Developing countries experience a much higher burden of PPH; it is also a momentous cause of maternal death in the developed world. Death from PPH occurs in about 1 per 1000 deliveries in low-resource countries compared with 1 per 100,000 deliveries in high-resource countries. Globally, PPH causes 44,000 to 86,000 deaths per year considering it the leading cause of death in pregnancy (El Badawy, et al., 2017).

Early identifying maternal risks for postpartum hemorrhage is still an important and useful key point in daily practice because a high risk pregnancy can then be closely monitored by a special team to modify their risk factors. As a result, this may lead to a reduction of maternal morbidity and mortality (Lertbunnaphong, et al., 2010).

Aim of the study

Early identification of risk factors for primary postpartum hemorrhages and measure the association between these factors and the occurrence of primary PPH at admission.

Research Question

- What are the levels of women risk factors for primary postpartum hemorrhage at admission?

Subjects and Methods

Research Design

A descriptive cross-sectional research design was utilized to fulfill the aim of this study.

Research setting

This study was conducted at Minia university hospital for maternity and child at antenatal care department, delivery room and immediate post-partum room.

Subjects:

The target population included all women in last trimester of pregnancy were admitted to hospital for vaginal or cesarean section (CS) delivery during a period of six month.

Sample included two groups study group who are at risk of PPH, which control group not suffer from PPH during labor.

Inclusion Criteria:

- Females showing the clinical diagnosis of primary PPH .
- Age (20:45 years)
- Females who were admitted to antenatal unit at MUHOP.
- Women have blood loss 500ml or more for vaginal delivery, 1000 ml or more for cesarean section.

Exclusion Criteria:

- Prenatal chronic disease.
- Females with pregnancy induced diseases (gestational diabetes and preeclampsia and those taking anti-coagulant drugs during pregnancy).

- Women were diagnosed with secondary PPH.
- Preterm labor and gestational age less than 36 weeks.
- Home delivery.

Control group:

Females who were admitted to hospital for vaginal or cesarean section delivery in last trimester of pregnancy of any age and parity and not suffered from primary PPH during labor.

Tools of the study

To achieve the goal of the study, data was collected through using the following

Tools:

Tool I: Socio-demographic characteristics including (age, residence, educational level, occupation and income).

Tool II: Risk factors assessment tool designed by (The Association of Women's Health, Obstetric and Neonatal Nurses, 2015.) to determine level of risk factor of primary postpartum hemorrhage at admission for PPH divided into three parts, to assess low risk factors (5) included (no previous uterine incision, singleton pregnancy, ≤4- previous vaginal births,,etc.) moderate risk factor (11) included (induction of labor (with oxytocin) or cervical ripening, multiple gestation, >4 - previous vaginal births, prior cesarean birth or prior uterine incision, large uterine fibroids, history of one previous PP.. etc) and high-risk factors (8) included (Active bleeding more than "bloody show, has 2 or more moderate symptoms of risk factor, suspected placenta accrete or percreta, Known coagulopathy, History of more than one previous PPH,,etc.) (The Association of Women's Health, Obstetric and Neonatal Nurses, 2015).

Procedure:

An official letter was requested from the Dean of the faculty of Nursing at Minia University to director of Minia university hospital for maternity and child, asking for permission to collect data. Meeting with selected hospital manager to explain the objectives and aim of the study who helped to gain their cooperation and to allow interviewing women during minimal workload activities.

The investigator was attending to selected hospital to collect the data from 9.00 AM to 1.00 PM in two days each week (Sunday and Monday) for six months. The investigator was collected data from antenatal care department, delivery room and immediate post-partum room for six months. The investigator was collect data from 3-6 women each week.

All women were informed that their participation is voluntary and reassurance was given to the women about the confidentiality of their responses. The investigator explained the aim and nature of study briefly through direct personal communication that it was take time from 40-50 minutes with the participants. Oral consent was obtained from the participants before inclusion in the study.

After that the investigator was distribute all questionnaires to women who participated in the study and asked them to fulfill them and the investigator spend this time with women during fulfilling the questionnaires. The investigator was reminding women to answer all questions that present in questionnaires. Duration of data collection was started from middle July 2019 to the middle of December 2019. At the end of data collection the investigator gave

women advices and instructions about risk factor for primary post-partum hemorrhage.

Validity and Reliability

To establish validity, The questionnaire was be piloted on panel of five experts in the field of obstetric and gynecological staff and Nursing professors who reviewed the instruments for clarity ,relevance, comprehensive understanding ,applicability and easiness ,To establish reliability, statistically done alpha Cronbach way to check the stability of the internal consistency of instrument was 0.651

Ethical consideration:

A written initial approval was obtained from the dean of the faculty of nursing and from the research ethical committee of the faculty of nursing, Minia University, and approval to conduct the study was obtained from the dean of the faculty of nursing, Minia University.

Oral informed consent was obtained from women who participated in this study after explaining the nature and purpose of the study. Participants were informed that their participation in the study was completely voluntary and acceptance of participants was obtained.

Results

Table (1): Distribution of the study sample regarding their socio-demographic characteristics (n= 120).

Socio-demographic characteristics	Study group (n= 60)		Control group (n= 60)		Test of significance	
	No.	%	No.	%	X ²	P - value
Age / years						
Less than 25	13	21.7	13	21.7	1.100	.777
25 - 30	10	16.7	11	18.3		
31- 35	26	43.3	29	48.3		
More than 35	11	18.3	7	11.7		
Mean ± SD	25.9 ± 14.1		25.4 ± 13.8			
Residence						
Urban	33	55.0	35	58.3	2.136	.144
Rural	27	45.0	25	41.7		
Educational level						
Illiterate	19	31.7	11	18.3	6.133	.105
Basic education	16	26.7	12	20.0		
Secondary	10	16.7	10	16.7		
University education	15	25.0	27	45.0		
Occupation						
Worker	14	23.3	20	33.3	1.477	.224
House wife	46	76.7	40	66.7		
Income						
Low	49	81.7	41	68.3	2.844	.092
High	11	18.3	19	31.7		

Table 1: shows that, 43.3% of study group and 48.3% of control group aged between 31 – 35 years with mean age 25.9 ± 14.1 and 25.4 ± 13.8 years respectively.

Regarding residence, 55.0% of study group and 58.3% of control group lived in urban area, 26.7% of study group and 20.0% of control group have basic education level.

Concerning occupation, 76.7% of study group and 66.7% of control group were housewives and 81.7% vs 68.3 of them had low income level respectively.

There were no statistically significance differences between study and control groups regarding their socio-demographic characteristics

Pilot study:

It was carried out on 10% of the total study sample (10 women). It was clarity of the tools, assessment of feasibility of fieldwork & to detect any possible obstacles that might face the investigator with interfere with data collection. Necessary modifications were done based on contents for more simplicity, and clarity. The subjects were included to the actual sample.

Statistical design

Data entry was done using compatible personal computer. Statistical analysis done by using statistical package of social science (SPSS, IBM version 25) and excel for figures. The content of each tool was analyzed, categorized and then coded. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations for quantitative variables. Statistical significance used at P value <0.05. Odd's Ratio (OR) and their 95% confidence intervals (95% CI) were calculated to compare risk factors for PPH in both groups.

Table (2): Distribution of the study sample regarding their low risk factors of primary post-partum hemorrhage (n= 120)

Low risk factors	Study group		Control group		Test of significance	
	No.	%	No.	%	OR (95% CI)	P - value
No previous uterine incision						
Yes	12	20.0	38	63.3	.145 (.064 - .329)	.0001**
No	48	80.0	22	36.7		
Singleton pregnancy						
Yes	53	88.3	56	93.3	.541 (.150 – 1.954)	.343
No	7	11.7	4	6.7		
Less than or equal 4- Previous vaginal births						
Yes	24	40.0	27	45.0	.581 (.150 – 1.954)	.657
No	36	60.0	33	55.0		
No History of PPH						
Yes	42	70.0	55	91.7	1.107 (.034 - .334)	.02*
No	18	30.0	5	8.3		
Not known bleeding disorder						
Yes	38	63.3	56	93.3	.123 (.039 - .387)	.0001**
No	22	36.7	4	6.7		

**significant at P value < 0 .01

Table (2): presents that, study group had low risk for current PPH in previous uterine incision, and known bleeding disorder by less than one folds (OR= .145, and .123 respectively) and history of PPH by more than one folds (OR= 1.107) with statistically significance differences with P – value ≤ .0001, .0001, and .02 respectively.

Table (3): Distribution of the study sample regarding their moderate factors of primary post-partum hemorrhage among study sample (n= 120).

Moderate risk factors	Study group		Control group		Test of significance	
	No.	%	No.	%	OR (95% CI)	P - value
Induction of labor						
Yes	34	56.7	16	26.7	.179 (.082 - .395)	.0001**
No	26	43.3	44	73.3		
Multiple gestation						
Yes	9	15.0	1	1.7	10.412 (1.275 – 84.998)	.008**
No	51	85.0	59	98.3		
More than 4 - previous vaginal births						
Yes	36	60.0	33	55.0	.581 (.150 – 1.954)	.657
No	24	40.0	27	45.0		
Prior cesarean birth or prior uterine incision						
Yes	43	71.7	20	38.3	7.231 (3.198- 16.347)	.0001**
No	17	28.3	40	61.7		
Large uterine fibroids						
Yes	15	25.0	2	3.3	9.667 (2.102- 44.460)	.001**
No	45	75.0	58	96.7		
History of one previous PPH						
Yes	8	13.3	3	5.0	1.247 (.140 – 1.954)	.05*
No	52	86.7	57	95.0		
Family history in first degree relatives who experienced PPH						
Yes	5	8.3	7	11.7	.821 (.425 – 1.828)	.845
No	55	91.7	53	88.3		
Chorioamnionitis						
Yes	16	56.7	5	8.3	4.0 (1.359 – 11.774)	.008**
No	44	73.3	55	91.7		
Estimated fetal weight greater than 4 kg						
Yes	10	16.7	3	5.0	2.20 (2.012 – 7.214)	.032*
No	50	83.3	57	95.0		
Morbid obesity (body mass index [BMI] >35)						
Yes	25	41.7	19	31.7	2.347 (1.067 – 5.162)	.032*
No	35	58.3	41	68.3		
Polyhydramnios						
Yes	36	60.0	10	16.7	7.500 (3.196 – 17.601)	.0001**
No	24	40.0	50	83.3		

**significant at P value < 0 .01

*significant at P value < 0 .05

Table (3): shows that, study group had moderate risk for current PPH in multiple gestation by more than ten folds (OR= 10.412), large uterine fibroids by more than nine folds (OR= 9.667), prior cesarean birth or prior uterine incision, polyhydramnios by more than seven folds (OR= 7.231 & 7.500 respectively), and chorioamnionitis by four folds (OR= 4.0) with statistically significance differences.

Table (4): Distribution of the study sample regarding their high factors of primary post-partum hemorrhage among study sample (n= 120).

High risk factors	Study group		Control group		Test of significance	
	No.	%	No.	%	OR (95% CI)	P - value
Active bleeding more than “bloody show”						
Yes	7	11.7	2	3.3	3.830 (.762 – 19.258)	.05*
No	53	88.3	58	96.7		
Has 2 or More moderate symptoms of risk factors						
Yes	56	93.3	4	6.7	196 (46.692 – 822.757)	.0001**
No	4	6.7	56	93.3		
Suspected placenta accretes or percreta						
Yes	21	35.0	3	5.0	10.231 (2.855 – 36.666)	.0001**
No	39	65.0	57	95.0		
Known coagulopathy						
Yes	8	13.3	2	3.3	4.462 (.906 – 21.967)	.05*
No	52	86.7	58	96.7		
History of more than one previous PPH						
Yes	10	16.7	2	3.3	2.636 (.491 – 14.157)	.05*
No	50	83.3	58	96.7		
Hematocrit <30 AND other risk factors						
Yes	39	65.0	5	8.3	20.429 (7.091 – 58.852)	.0001**
No	21	35.0	55	91.7		
Platelets <100,000/mm ³						
Yes	40	66.7	2	3.3	58.000 (12.834 – 262.113)	.0001**
No	20	33.3	58	96.7		
Placenta previa or low-lying placenta						
Yes	38	63.3	0	.0	11.769 (4.391 – 31.546)	.0001**
No	22	36.7	60	100.0		

**significant at P value < 0 .01

*significant at P value < 0 .05

Table (4): result of presents table show that, study group had high risk for current PPH in women had two or more moderate symptoms of risk factors by more than one hundred folds (OR= 196), platelets <100,000/mm³ by more than fifty folds (OR= 58.00), hematocrit <30 by more than twenty folds (OR= 20.429), placenta previa and suspected placenta accretes by more than ten folds (OR= 11.769& 10.231 respectively), with statistically significance differences.

Discussion

Postpartum hemorrhage (PPH) is a major cause of maternal mortality and severe morbidity all over the world. The World Health Organization (WHO) estimates that PPH is a cause of approximately 25% of maternal deaths (Andrikopoulou & D’Alton, 2019). This study aimed to early identification of risk factors for primary postpartum hemorrhage.

Regarding the socio-demographic characteristics of the study and control groups, the current study showed that less than half of the study group and control group aged between 31 – 35 years This result comes in the line with (El Badawy, et al., 2017) who studied "assessment of risk factors for primary postpartum hemorrhage at Zagazig university hospitals" and reported that the most of them were in the age group 19-34 years (81.4% of cases and 66.1% of controls).

This result comes in to agree with Miller et al., (2017) who studied "postpartum hemorrhage following vaginal delivery: risk factors and maternal outcomes" and reported that less than one-third of the cases and control group their age was in between 27:35 years. These results come to differ with (Gudeta, et al., 2018) who studied "magnitude of post-partum hemorrhage among women who received postpartum care at Bedele hospital southwest, Ethiopia, 2018" and reported that less than half of the studied sample their age were in between 20:24 years.

Regarding distribution of the study sample by their low risk factors of primary post-partum hemorrhage, the current study showed that the study group had a low risk for current PPH in women had a previous uterine incision, more than four previous vaginal birth, and known bleeding disorder with statistically significant differences in which P – value ≤ .0001, .02, and .0001 respectively.

This result come in the line with (El Badawy et al., 2017) who founded that more than two-thirds of the study group and most of the control group had no history of PPH. This result was confirmed by (Belfort., 2019) who studied "Postpartum hemorrhage: Management approaches requiring laparotomy" and stated that the uterine incision increases the risk of PPH. Also this result comes in the line with (Dionne et al., 2015) who stated that there association between low-risk factors and PPH. This result might be due to pregnant women known they suffered from bleeding disorders will continue antenatal visits to decrease risk factors for any postpartum complications and uterine incision is an unusual cause of post-partum hemorrhage as concluded by Zhang et al., (2020)

Regarding distribution of the study sample by their moderate risk factors of primary post-partum hemorrhage, the current study results showed that study group had a moderate risk for current PPH as multiple gestations, history of one previous PPH, prior cesarean birth or prior uterine incision fetal weight greater than 4 kg, morbid obesity and polyhydramnios, with statistically significant differences in which P value<.008,.05,.0001and .0001 Respectively.

This result comes in the line with (El Badawy et al., 2017) who stated that There are many risk factors for primary PPH as increasing maternal age, previous APH and PPH, macrosomia, maternal anemia, obesity, vaginal delivery, labor induction, delivery trauma, retained placenta, and placenta previa. Maternal anemia, retained placenta, macrosomia, and previous PPH were the most significant risk factors for primary PPH.

This finding might be labor induction may increase duration of labor which may increase frequency of PPH and retained placenta causes uterine atony by preventing uterine contraction, which compresses the myometrial spiral arteries.

Retained products may cause delayed PPH by interfering with involution of the placental site. Also, multiple gestation and poly-hydramnios increase uterine atony by uterine over distension, and there was an evidence suggests that PPH during cesarean birth is occurring more frequently due to not administration of uterotonic agent after delivery. In additional, pregnant women with uterine fibroids are at increased risk for cesarean delivery, and breech presentation and macrosomic is associated with maternal complications such as emergency cesarean section.

Wetta et al., (2013) explained that identified obesity, anemia and infection (chorioamnionitis) as potential independent risk factors, because of its tocolytic effect, one would expect magnesium sulfate to be associated with an increase in the risk of atony or postpartum hemorrhage.

Regarding Distribution of the study sample by their high factors of primary post-partum hemorrhage among study sample, the present study illustrated that study group had a high risk for current PPH in women had two or more moderate symptom of risk factors, platelets level $<100,000/\text{mm}^3$ by more than fifty folds, hematocrit level <30 by more than twenty folds, placenta previa and suspected placenta accretes by more than ten folds with statistically significant differences.

This result differs from (Nyflot et al., 2017) who studied " Risk severe PPH, anticoagulant medication, anemia at booking, severe pre-eclampsia or HELLP syndrome, uterine fibromas, multiple pregnancies and assisted reproductive technologies. This finding might be explained by, the placenta previa cause poor myometrial contraction with continue hemorrhage from numerous vessels beneath placental area and if the pregnant women known they suffered from bleeding disorders will continue antenatal visits to decrease risk factors for any postpartum complications.

Sneha et al., (2017) reported that the rate of red cell destruction increases during the first day of puerperium leading to a decreased haematocrit and women given oral iron supplementation during pregnancy have larger red cells. It could be that selective destruction of these larger red cells allied to a transient increase in plasma volume during the early puerperium accounts for the initial fall in haematocrit.

Conclusion

Based on the findings of the present study it was concluded that

Previous PPH, abnormality in platelet, hematocrit and coagulopathy were the most significant high risk factors for primary PPH while the moderate risk for current PPH were multiple gestation, history of one previous PPH, prior cesarean birth or prior uterine incision, and polyhydramnios.

Recommendations

Based on the results of the present study are:

- Encourage regular antenatal visit to early detection of risk factors of PPH, and providing the women health education about PPH risk factors.
- Nurses should encourage pregnant women for treatment of some risk factor as anemia and encourage hospital delivery for women at risk of PPH.

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