# Factors Associated with Early Post-Partum Haemorrhage among Mothers during Postpartum Period at Castle Street Hospital for Women in Colombo, Sri Lanka

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**Abstract**- Early Post-Partum Hemorrhage (early PPH) is the leading cause of maternal mortality worldwide, where nearly one-quarter of all maternal deaths in most low-income countries. The study aimed to assess the factors associated with early postpartum hemorrhage among mothers during the postpartum period at Castle Street Hospital for Women. A retrospective Cohort Study was conducted among a sample of 300 mothers in the post-partum period to identify and evaluate the risk factors for early PPH at Castle Street Hospital for Women in Sri Lanka. Data was collected using a systematic sampling method and extracted from the delivery records during the 2017 and 2018 years into a data extraction sheet. It consisted of, Part A- Demographic data, Part B - Current antenatal and obstetric history, Part C - Past obstetric history, Part D - Past medical and surgical history, Part E - History of current delivery. Data were analyzed using SPSS 23 version in percentages and Chi squire. The mean age of the sample was 30.39±5.17 years. The majority, 39.9% of mothers, were educated up to secondary level and 33% of mothers were "O positive" in the blood group. Among the sample anemia, diabetes, hypertension, heart disease, renal diseases, and hyperthyroidism were presented respectively 12.0%, 15.3%, 11.0%, 1.0%, 0.7%, and 4.3%. In conclusion, the identified risk factors for early PPH have shown a significant association with anemia, diabetes hypertension (p=0.001) and hyperthyroidism (p=0.009) conditions of the mothers' method of delivery (p=0.001), duration of labour in normal vaginal delivery (p=0.001), vaginal tears (p=0.001), retained placenta (0.001), and prostaglandin administration (p=0.001).

***Keywords— risk factors, early postpartum haemorrhage***

## I. INTRODUCTION

Early Post-Partum Hemorrhage (PPH) one of the major health concerns in maternal and child health (Nyfløt et al., 2017) contribute to 6% of global prevalence (Ononge et al., 2016; Ngwenya, 2016). Also, acts as a leading cause for premature maternal motility with an estimate of 500,000 global deaths per year (Knight et al., 2009; Ononge et al., 2016). According to the American College of Obstetricians and Gynecologists (ACOG) practice bulletin, the estimated death rate is reported as one death per every four minutes and 140,000 deaths per year (Zelop, 2006; Dahlke et al., 2015). But some literature has reported 25% of annual global (Biguzzi et al., 2012; Driessen et al., 2011).

PPH is usually an unpredictable event (Zelop, 2006; Biguzzi et al., 2012); where both known (maternal and obstetric) and unknown risk factors are contributed (Nyfløt et al., 2017; Ngwenya, 2016). The incidence and mortality rate are high in lower-income countries compared to the developed countries (Ononge et al., 2016; Lu et al., 2005), and Driessen et al., 2011 is reported that PPH is the leading cause of maternal mortality in sub-Saharan Africa. Respectively, according to the conducted prospective cohort study in Uganda, is revealed that 9% of overall PPH incidence with 1.2% of severe PPH (Ononge et al., 2016). While Smith and Mousa, in 2007 are reporting 6.7 of severe PPH per 1,000 deliveries in the UK, Biguzzi et al., 2012 is reporting that the current incidence of PPH is increasing in developed countries also compared to its past. PPH incidence is high among nulliparous and multiparous women compare to the other parity

(Nulliparous incidence - 19% of PPH, 4.2% of severe PPH in the Netherlands) (Bais et al., 2004; Biguzzi et al., 2012; Sosa et al., 2009).

A single definition for PPH is not available and generally, it is defined as bleeding from the genital tract of 500 ml or more following the delivery (WHO,1990; Smith and Mousa, 2007). But the alternative definitions have developed after considering the volume of blood loss after delivery through the genital tract in different amounts. According to that, PPH is considered as loss of 500 ml of blood after vaginal delivery or 750 ml after the caesarian delivery (Australian definition) (Knight et al., 2009).

PPH is classified as primary PPH which presents within the first 24 hours and secondary PPH which is clinical presents between after the first 24 hours to 12 of the weeks of postpartum (Zelop, 2006). But the standard classification is available as international classification of disease, 9th revision, clinical modification (ICD-9-CM code classification).

The causes of PPH are multifactorial. The etiology of primary PPH has undergone four categories including uterine atony, tissues, trauma, and coagulation disorders (Zelop, 2006). The specific etiology for the secondary PPH; referred to as persistent or delayed PPH, is usually unknown and clinically presents with 1% -3% of pregnancies (Ngwenya, 2016; Zelop, 2006). Although exact etiology is unknown, secondary PPH has shown an association with the identified risk of uterine inversion, secondary sub involution of placental site, maternal infections, retained placental products and inherited coagulation defects (Zelop, 2006). Other than this classification, causes and risk factors can be classified as the individually affect and medical management related to the risk factors (Dahlke et al., 2015).

Also, Driessen et al., 2011 have identified three characteristic categories of risk factors of severe PPH including, (1) factors associated with the women and aspects of labor and delivery (primi and multiparas, previous PPH and cesarean delivery, labor induction by cervical ripening, prolonged labor, episiotomy, prophylactic uterotonics), (2) factors associated with the initial management of the PPH (delayed diagnosing, senior obstetric care delayed oxytocin administration and manual examination of the uterine cavity), and (3) organizational characteristics (being a non-teaching (non-university) public hospital and delivery unit, secondary level caring unit, annul the number of delivery in the unit and 24-hour availability of obstetrician and anesthesiologist) (Driessen et al., 2011; Kanchana, 2018). The epidural analgesia, non-delayed obstetric and anesthetic care had associated with a significant risk reduction of severe PPH. Also, it was revealed that 51% of severe PPH cases minimally present three of the identified risk factors (Driessen et al., 2011).

Maternal age (>35 or < 18 years), multiple pregnancies, (Bateman et al., 2010) gravida and parity (prim gravida, nulliparous and grand multiparty (Ononge et al., 2016), fetal macrosomia (>4 kg) body mass index (BMI)- (<25 or >35 kg/$m^2$), gestational age, pre-existing or current pregnancy-related overwhelming maternal disorders (hypertension, severe pre-eclampsia, HELLP syndrome, anemia and low platelet level, diabetes mellitus), unhealthy behaviors (smoking during pregnancy) (Kramer et al., 2011) previous antepartum hemorrhage, miscarriages and previous PPH incidences, uterine anomalies or uterine disorders (fibroma), previous surgery (caesarian or uterine surgeries), ethnicity (especially Asian and Hispanic ethnicity) and marital status have identified pre-pregnancy and current pregnancy related risk factors (Knight et al., 2009; Biguzzi et al., 2012; Zelop, 2006; Nyfløt et al., 2017; Bateman et al., 2010; Ngwenya, 2016; Kramer et al., 2013; Reyal et al., 2004; Sheiner et al., 2005; Wetta et al., 2013; Farine , 2015; Anderson, 2007 & Kanchana, 2018).

Furthermore, current pregnancy is in the identified risk of PPH with the assisted reproduction technologies, over distended uterus with poly-hydroaminosis or multiple gestations or macrosomia, Premature Rupture Of Membrane (PROM), placental abnormalities (abnormal placental attachment such as placenta previa accrete, increta, percreta, placental abruption), maternal infections (eg: chorionamnionitis, HIV), coagulation disorders and anticoagulant treatment during pregnancy (Zelop, 2006; Nyfløt et al., 2017; Bateman et al., 2010; Biguzzi et al., 2012; Ngwenya, 2016). It is reported that HIV positive patients are more likely to PPH compared to negative patients (Reyal et al., 2004).

The incidence and severity of PPH associated with the cesarean deliveries are high compared to the vaginal deliveries (Oyelese et al., 2007; Ononge et al., 2016; Bateman et al., 2010; Knight et al., 2009) and with the cesarean surgery the specific obstetric

management, care, and close monitoring need to be taken to minimize the complications (Nyfløt et al., 2017). The assessment of Early Warning Systems to obstetric practice (Modified Obstetric Early Warning Scoring System MOEWS) is important and correct hemodynamic assessment through MOEWS significantly reduces the severity of PPH (Knight et al., 2009).

The complications of PPH are included, organ failure (acute renal and respiratory failure), sepsis, hysterectomy, prolonged mechanical ventilation, and coagulopathy (Bateman et al., 2010). Furthermore, Bateman et al., 2010 are reported that PPH is relatively common in their study; highly associated with uterine atony, causes maternal mortality and morbidity.

In Sri Lanka, PPH accounted for 12.7% of maternal deaths in 2008. Therefore, identifying Factors associated with early post-partum hemorrhage is important its proper management.

## II. METHODOLOGY

A retrospective cohort study was conducted for six months of duration at Castle Street Hospital for Women (CSWH) in Colombo, Sri Lanka to assess the factors associated with early Post-Partum Haemorrhage. The study sample included 300 mothers who have undergone delivery during the years 2017 and 2018. Data was extracted from the preserved delivery records in the Bed Head Ticket (BHT). The systematic sampling method was used to achieve sample size and a pre-test was performed before the main study. The data extraction sheet consisted of, Part A- Demographic data, Part B - Current antenatal and obstetric history, Part C - Past obstetric history, Part D - Past medical and surgical history, Part E - History of the current delivery. Data was analyzed using SPSS 23 version using descriptive and interferential statistics. The ethical approval was obtained from Ethics Review Committee at KIU (KIU/ERC/20/04) and hospital permissions were obtained from Director and Chief Nursing Officer at Castle Street Hospital for Women, Sri Lanka.

## III. DISCUSSION AND ANALYSIS

Out of 300 participant's majority was Sinhalese (79.7%) and others while Muslim, Tamil 7% (21) and Burger respectively represent 12.3%, 7% and 1%. Point seven percentage (0.7%) was unmarried, 0.3% are divorced. Even though 62.7% were unemployed and 39.7% of post-natal mothers have been educated up to A/L (Figure 01).

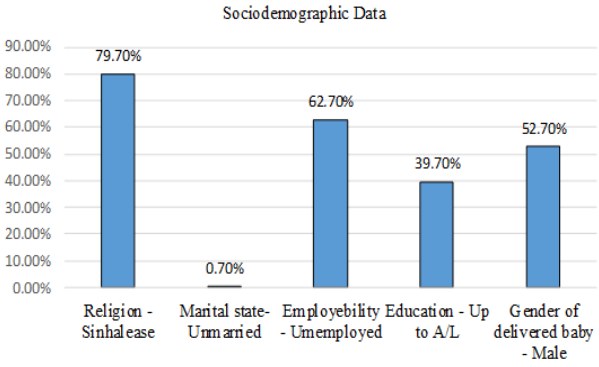


Figure 1: Sociodemographic Data

The majority of participants had delivered baby boys (52.7%) while only 2% of them had multiple pregnancies. Labor method included, normal vagina (17.3%), instrumental vacuum (7.3%) caesarean (62.3%) and forceps (13.0%) while duration of labor included, 0-5 hours (21.9%), 5-10 hours (54.7%) and 10-15 hours (23.4%). In the study sample, 8% of first-degree genital tract trauma and 2% second-degree genital tract trauma were reported (Figure 2).

The majority of early postpartum hemorrhagic mothers (33%) had "O positive" blood group and retained placenta was seen among 26% of them (Figure 3). The anemia (12%), diabetes mellites (DM) (15.3%), hypertension (11%), hyperthyroidism (4.3%), perineal tears (10%), prolong labor duration (23.40%), retained placenta (26.0%), and labor induction with prostaglandin (7%) was identified as associated risk factors for early PPH (Figure 2).

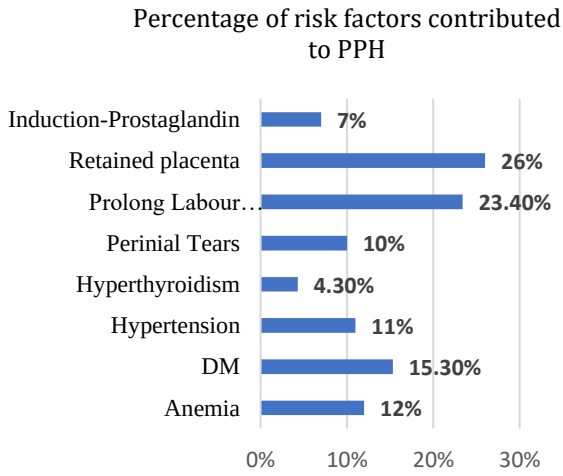


Figure 2: Percentage of risk factors contributed to PPH

In this research study identified risk factors for PPH were shown significant association between anemia, diabetes hypertension (p=0.001) and hyperthyroidism (p=0.009) conditions of the mothers', method of delivery (p=0.001), duration of labour in normal vaginal delivery (p=0.001), vaginal tears (p=0.001), retained placenta (0.001) and prostaglandin administration (p=0.001) (Table 01).

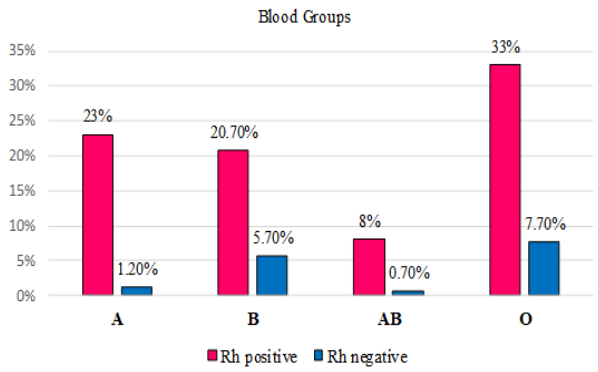


Figure 3: Blood Group Percentages

Table 1: Association between the identified risk factors and PPH

| Parameter | Chi value | P value |
|---|---|---|
| Anemia | 20.455 | .001 |
| Diabetes | 27.165 | .001 |
| Hyperthyroidism | 6.794 | .009 |
| Method of delivery | 18.511 | .001 |
| Duration of labour in normal vaginal delivery | 40.678 | .001 |
| Vaginal tears | 16.667 | .001 |
| Retained placenta | 52.703 | .001 |
| Prostaglandin administration | 11.290 | .001 |

CI - 95%, P <0.05

PPH is a leading cause of global maternal morbidity and mortality and (Nyfløt et al., 2017) contribute to 4% - 6% of global prevalence (Ononge et al., 2016; Nyfløt et al., 2017). Incidence and mortality rate related to PPH is high in lower-income countries compared to the developed countries (Ononge et al., 2016; Driessen et al., 2011; Kramer et al., 2011).

According to Bais et al., 2004, 61% of the severe PPH are reported among nulliparous women and Biguzzi et al. reported the high PPH incidence among nulliparous women to compare to the other party. The incidence is high with the cesarean than normal vaginal delivery (Driessen et al., 2011).

Due to the PPH being a global health concern, many studies had done to identify the risk factors, prevention, and management (Ononge et al., 2016; Dahlke et al., 2015; Kramer et al., 2013). The current study also conducted as a retrospective cohort study focusing to identify risk factors affecting the early PPH.

According to the available literature, even though definitions are varied generally, loss of > 500 ml blood after the following delivery is considered as PPH (Bais et al., 2004; Smith and Mousa, 2007). A loss of > 500 ml blood or more as standard PPH and exceeding amount of 1000 ml or more as a severe PPH and loss of > 500 ml blood after following vaginal and >1000 ml blood following the caesarian (Zelop, 2006; Bais et al., 2004; Bateman et al., 2010; Dahlke et al., 2015; Driessen et al., 2011; Biguzzi et al., 2012; Ononge et al., 2016; Bais et al., 2004; Dahlke et al., 2015).

Many studies have reported the risk factors for PPH as anemia, diabetes, hypertension, and hyperthyroidism, maternal age, multiple pregnancies, gravida and parity, fetal macrosomia, BMI, previous antepartum hemorrhage and previous PPH incidences, uterine anomalies or uterine disorders, previous caesarian, polyhydroaminosis, PROM, placental abnormalities, maternal infections, coagulation disorders and anticoagulant treatment (Knight et al., 2009; Biguzzi et al., 2012; Zelop, 2006; Nyfløt et al., 2017; Bateman et al., 2010; Ngwenya, 2016; Ononge et al., 2016; Sheiner et al., 2005).

The current study identified that antepartum risk factors were associated with PPH (P < 0.05) and it included anemia, hypertension, hyperthyroidism, perineal tears, prolong labor duration, and labor induction. Similar findings are given by the many of the studies and they were included the prolonged or obstructed labor, maternal fever and infections, obstetric management including labor induction, labor augmentation with oxytocin, using epidural analgesia, malposition, deep engagement, mode of delivery (especially caesarian and assisted deliveries with forceps or vacuum extractor), genital tract trauma, PROM and blood disorders (Nyfløt et al.,

2017; Bateman et al., 2010; Dahlke et al., 2015; Knight et al., 2009).

Many studies have shown the association between the identified risk factors with the PPH. The current study also, all identified risk factors anemia, diabetes hypertension, hyperthyroidism, vaginal tears, retained placenta, and prostaglandin administration; method of delivery and labor duration were significantly associated with the PPH. Although, labour induction is highly associated with the PPH still the usage of tocolytic agents such as oxytocin and prostaglandin (misoprostol) are common. The incidence of PPH is reported at a higher rate by using misoprostol versus oxytocin (Ononge et al., 2016).

As the limitation of the current study women who delivered by cesarean section had measured the blood volume by visual can be presented since visual estimation has a higher probability to underestimate the true volume of blood loss.

## IV. CONCLUSION

Many factors are associated with PPH. While concerning the stage of labor pre-pregnancy is at risk of pre-existing maternal disorders such as hypertension, anemia, diabetes, and hyperthyroidism. Prolong duration of labor. The identified risk factors for PPH were retained placenta, tears, perineal teas, prostaglandin administration, and duration of vaginal labor interfered with the intrapartum and postpartum period for PPH.

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