Association between Anemia during Pregnancy and post partum hemorrhage and perinatal outcome among women with vaginal Births in slemani maternity teaching hospital

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ABSTRACT

Over more than half a million women die due to complications of pregnancy and childbirth each year. In the developing countries the risk of dying in childbirth is 175 times that of developed countries.

Postpartum hemorrhage, is the leading cause of maternal death in developing countries characterized by bleeding (>500 mL) after birth of the baby.

Aim of the study: To evaluate whether maternal anemia contributes to greater blood loss at childbirth and 24 hours postpartum.

Patients and methods: This study is a cross sectional descriptive study, the target 233 patients will be pregnant ladies in labour seen in labour ward in slemani maternity teaching hospital, throughout the period of January first 2017 to August first 2017, evaluated the state of anemia in her third trimester, the hemoglobin level was measured for all the studied women, then they were divided in to groups according to their HB level.

Results: The median age of studied women was 28.5 years, and the median gestational age duration was 38.8 weeks, 44.6 percent were hemoglobin level was less than 11 gram / dl, 20.6 percent of these patients developed post partum hemorrhage. 6.4 percent need blood transfusions, 28.9 percent need medical treatment. Commonest causes of post partum hemorrhage among these patients were inertia, genital injury respectively.

Conclusions: The finding of this study support the association between anemia at delivery and the potential risk of PPH which remains currently debated.

1. INTRODUCTION

Anemia in pregnancy is defined as hemoglobin level below 11 g/dl (WHO)(Frass, 2015). It is one of the public health problems mostly in developing countries(Organization, 2007). World Health Organization (WHO) reported that the prevalence of anemia during pregnancy in developing countries exceeds 50% (Frass, 2015).

A normochromic, normocytic anemia may occur from the 7–8th week of gestation, due to the physiological increase in plasma volume that is relatively greater than the increase in red cell mass. However, the hemoglobin (Hb) should not fall to <11 g/dl in the first, or <10 g/dl in the second and third trimesters(Haram et al., 2001, Milman et al., 2000). More marked anemia may be due to iron, folate, or more rarely, vitamin B12 deficiency or hemoglobinopathy(Clark et al., 2012).

In pregnancy, anemia is mainly nutritional due to dietary deficiency of iron and folates(Sanghvi et al., 2010). But impaired absorption, chronic blood loss, increased requirement, concurrent medical disorders and
malaria are other contributing factors for anemia (Kalaivani, 2009). It has long been considered that anemia increases the risk of postpartum hemorrhage (PPH) (Ramanathan and Arulkumaran, 2006) and the two conditions together contribute to 40–43% of maternal deaths in Africa and Asia (Christian, 2008).

The effect of iron deficiency (before anemia) on maternal and fetal well-being is not fully understood, but mild deficiency is linked to increased delivery bleeding, poor fetal iron stores and an increased placenta: fetus weight ratio (Hindmarsh et al., 2000). Severe maternal iron deficiency is associated with premature delivery and low birth weight (Haram et al., 2001).

Hemorrhage is still one of the leading causes of maternal mortality in the United Kingdom with postpartum hemorrhage playing a significant role in the deaths of nine women in the last triennial report (Oyelese and Ananth, 2010). Primary postpartum hemorrhage is defined as the loss of 500 mL of blood from the genital tract following, but within the first 24 hours of, the delivery of the baby (Waterstone et al., 2001).

A caveat is added in that if the blood loss is <500 mL, but is sufficient to cause hypovolaemic shock in the patient, this is also classified as a primary postpartum hemorrhage. A new definition of massive postpartum hemorrhage has been introduced, being the loss of greater than 1000, 1500 or 2500 mL of blood. Owing to the relatively low risks of blood loss below these levels, the incidence of this complication is being used in some units as an indicator of the standard of maternity care and is being promoted by the Royal College of Obstetricians and Gynecologists as one of their clinical indicators on the maternity scorecard (Arulkumaran et al., 2008).

Despite the global significance of postpartum hemorrhage, little is known about factors that contribute to postpartum hemorrhage, especially in less-developed areas where 99% of maternal deaths occur. Severe anemia may weaken uterine muscular strength or lower resistance to infectious diseases, contributing to postpartum hemorrhage and subsequent maternal mortality (Rush, 2000, Bergström, 2003).

2. MATERIALS AND METHODS

Study design: This study was cross sectional descriptive study.

Sample size and duration of the study: The study included 233 pregnant women admitted to the labor ward of the maternity teaching hospital in Slemani city, throughout the period of January first 2017 to August first 2017, evaluated the state of anemia in her third trimester or sending for hemoglobin during the admission and these pregnant ladies will followed up during the period of labor and post-delivery for the first 24 hours for postpartum hemorrhage and perinatal outcome. Data collection was performed by the self-administered method. Intrapartum and post-partum blood loss was measured by specific container labeled in milliliter, calculate and weighing the number of pads had been used during labor and post-delivery.

Inclusion criteria: Single tone term pregnancy. Exclusion criteria: twin and higher order multiple pregnancy, patients with past history of post partum hemorrhage, patients with medical disease, history of bleeding tendency, patients on anti-platelets drugs (aspirin, LMWH).

Descriptive statistics and analytical statistics were used to test statistical difference and associations using SPSS version 21.
Statistical analysis: The data was entered into Excel sheet, then transported into Statistical Package for the Social Sciences (SPSS version 21.0) software program for statistical analysis. Were calculated for all variables, as well as analytical statistics were conducted to find the relations between variables; by using Chisquare, and analysis of variance (ANOVA). A p-value < 0.05 was considered as significant.

3. RESULTS

The mean age of patients which participative in our study was 28.5 years, and the mean gestational age duration was 38.8 weeks, as shown in table 1.

Table 1. Selected characteristics of patients enrolls in the study

| Variables             | Range | Minimum | Maximum | Mean | SD |
|-----------------------|-------|---------|---------|------|----|
| Maternal age (Years)  | 28    | 15      | 43      | 28.5 | 6.5|
| Maternal weight (kg)  | 34    | 56      | 90      | 72.6 | 8.6|
| Gravida               | 7     | 1       | 8       | 2.9  | 2.0|
| Para                  | 6     | 2       | 12      | 2.1  | 1.5|
| Gestational age in weeks | 7    | 34      | 41      | 38.8 | 1.3|
| Durations of delivery (hours) | 10 | 2       | 12      | 6.9  | 2.8|
| APGAR                 | 4     | 6       | 10      | 8.5  | 0.8|
| Fetal weight (Kg)     | 2.7   | 2.3     | 5.0     | 3.3  | 0.4|

The mean maternal weight was 72.6 kg, most of the patients had more than 2 babies as a mean, the mean durations of delivery were near 7 hours. As shown in table 2 the characteristics variable of the study groups.

Table 2: Effects of potassium and magnesium on RBC, HG, HCT, MCV and MHC in 2K1C hypertensive rats

| Variables | Frequencies | Percentages |
|-----------|-------------|-------------|
| Employment |             |             |
| Yes       | 80          | 34.3        |
| No        | 153         | 65.7        |
| Mother education | |             |
| illiterate | 29          | 12.4        |
| Primary    | 81          | 34.8        |
| Secondary  | 50          | 21.5        |
| school    | 73          | 31.3        |
| University |             |             |
| Hb (gm)   |             |             |
| >11gm     | 105         | 45.1        |
| 9.5-11gm  | 104         | 44.6        |
| 8gm-9.5gm | 11          | 4.7         |
| <8gm      | 13          | 5.6         |
| Mode of delivery |    |             |
| NVD       | 67          | 28.8        |
| IOL       | 33          | 14.2        |
| Augmentation OL |        |             |
| Postpartum bleeding |     |             |
| No        | 165         | 61.8        |
| Yes       | 67          | 38.2        |
| Blood transfusions |     |             |
| No        | 165         | 61.8        |
| Yes       | 67          | 38.2        |
| medical Rx |             |             |
| No        | 165         | 61.8        |
| Yes       | 67          | 38.2        |
| Causes PPH |             |             |
| Inertia   | 8           | 88.9        |
| Genital injury | 1       | 11.1        |
| Gender    |             |             |
| Female    | 144         | 61.8        |
| Male      | 89          | 38.2        |

As shown the results in table 3 the patients with hemoglobin level more than 11 gram had no blood loss more than 1000 ml during follow up period compared with 6.8% of patients with hemoglobin less than 11 gram developed post partum blood loss more than 1000 ml which was statistically significant compared with no patients developed post partum hemorrhage with hemoglobin more than 11 gram. 50 percent of patients (8 patients) with blood loss more than 1000 ml need blood transfusion compare with only 1.6 percent (3 patients) need
blood transfusion among patient with blood loss less than 500ml which was statistically significant.

The mode of delivery either spontaneous vaginal delivery, augmentations of labor, inductions of labor does not affect the amount of post partum hemorrhage with the p value 0.045 which was statistically not significant.

Table 3 shows the relation between post partum hemorrhage and the variable of the study groups.

| variables of the study group | Postpartum hemorrhage | P values |< 500ml | 500ml-1000ml | >1000ml |
|-----------------------------|-----------------------|----------|---------|--------------|--------|
| Variables                   |                       |          | N (%)   | N (%)        | N (%)  |
| Hb (gm)                     |                       |          |         |              |        |
| >11gm                       |                       |          | 89      | 16           | 0      |
| 9.5-11gm                    |                       |          | 96      | 5            | 3      |
| 8gm-9.5gm                   |                       |          | 0       | 6            | 5      |
| <8gm                        |                       |          | 0       | 5            | 8      |
| Mode of delivery            |                       |          |         |              |        |
| NVD                         |                       |          | 100(54.1%) | 19 (59.4%) | 14 (87.5%) |
| IOL                         |                       |          | 56 (30.3%) | 11 (34.4%) | 0 (0%) |
| Augmentation OL             |                       |          | 29 (15.7%) | 2 (6.3%) | 2 (12.5%) |
| Blood transfusions          |                       |          |         |              |        |
| No                          |                       |          | 182 (98.4%) | 27 (81.3%) | 8 (50.0%) |
| Yes                         |                       |          | 3 (1.6%) | 5 (12.5%) | 8 (50.0%) |

The result in table 4. Shows only 3 patients with hemoglobin more than 11 gram need blood transfusion after delivery compare with 13 patients with hemoglobin less than 11 grams need blood transfusion which was statistically significant.

5 patients with severe anemia (Hb< 8 gm) develops uterine atony (inertia), in which 2 of them need hysterectomy because of uncontrolled bleeding compare with only 1 patient develops uterine atony who had hemoglobin more than 11 gram.

The perinatal outcome, regarding Apgar score as shown in table 5 was 8.6±0.9 Mean±S.D in groups of patients with hemoglobin more than 11 gram compare with Apgar score of 7.8±0.6 Mean±S.D in groups of patients with hemoglobin less than 8 gram which was statistically not significant.
Table 4. The relation between the severity of anemia and the variable of the study group

| Variables       | Anemia severity (Hb) | P values |
|-----------------|----------------------|----------|
|                 | >11gm | 9.5-11gm | 8gm-9.5gm | <8gm |
| Employment      |       |          |           |      |
| Yes             | 69 (65.7%) | 5 (4.8%) | 0 (0%) | 6 (46.2%) | <0.001 |
| No              | 36 (34.3%) | 99 (95.2%) | 11 (100%) | 7 (53.8%) |
| Mother education|       |          |           |      |
| Illiterate      | 4 (3.8%) | 15 (14.4%) | 6 (54.5%) | 4 (30.8%) |
| Primary         | 6 (5.7%) | 71 (68.3%) | 0 (0%) | 4 (30.8%) | <0.001 |
| Secondary school| 31 (29.5%) | 14 (13.5%) | 3 (27.3%) | 2 (15.4%) |
| University      | 64 (61%) | 4 (3.8%) | 2 (18.2%) | 3 (23.1%) |
| Mode of delivery|       |          |           |      |
| NVD             | 56 (53.3%) | 62 (59.6%) | 6 (54.5%) | 9 (69.2%) | <0.001 |
| IOL             | 22 (21.0%) | 39 (37.5%) | 4 (36.4%) | 2 (15.4%) |
| Augmentation OL | 27 (25.7%) | 3 (2.9%) | 1 (9.1%) | 2 (15.4%) |
| Blood transfusions|      |          |           |      |<0.001 |
| No              | 102 (97.1%) | 104 (100%) | 11 (90.9%) | 0 (0%) |
| Yes             | 3 (2.9%) | 0 (0%) | 2 (9.1%) | 11 (84.6%) |
| Causes PPH      |       |          |           |      | 0.905 |
| inertia         | 1 (100%) | 1 (100%) | 1 (100%) | 5 (83.3%) |
| genital injury  | 0 (0.0%) | 0 (0%) | 0 (0%) | 1 (16.7%) |
Table 5. Shows the Mean±S.D of severity of anemia and the relation to the variables.

| Variables                  | Anemia severity (Hb) | P values |
|----------------------------|----------------------|----------|
|                            | >11gm | 9.5-11gm | 8gm-9.5gm | <8gm |        |
|                            | Mean±S.D | Mean±S.D    | Mean±S.D | Mean±S.D    |        |
| Maternal age (Years)       | 28.4±5.7 | 26.9±6.2 | 34.2±5.4 | 35.8±6.9 | <0.001 |
| Maternal weight (kg)       | 72.9±9.9 | 71.2±6.6 | 80.9±5.3 | 80.4±7.6 | <0.001 |
| Gravida                    | 2.3±1.4 | 2.9±2.1 | 4.8±2.3 | 5.4±1.6 | <0.001 |
| Para                       | 1.5±0.9 | 2.4±1.4 | 4.3±1.9 | 4.2±1.7 | <0.001 |
| Gestational age (Weeks)    | 38.6±1.4 | 38.9±1.2 | 39.3±0.7 | 39.4±1.1 | 0.066 |
| Durations of delivery (hours) | 7.7±2.6 | 6.4±2.9 | 6.1±2.2 | 5.5±2.6 | 0.002 |
| APGAR                      | 8.6±0.9 | 8.5±0.8 | 8.5±0.9 | 7.8±0.6 | 0.025 |
| Fetal weight (Kg)          | 3.2±0.3 | 3.3±0.3 | 4±0.7 | 3.7±0.4 | <0.001 |

4. DISCUSSION

Our finding in this study of 233 pregnant lady underwent vaginal delivery in labor ward in Slemani maternity teaching hospital is a strong association between moderate-to-severe anemia at labor and greater severity of blood loss at delivery and postpartum.

The patients with hemoglobin level more than 11 gram had no blood loss more than 1000 ml during follow up period compared with 16 patients with hemoglobin less than 11 gram developed post partum blood loss more than 1000 ml which was statistically significant, our results agree with Justine A. Kavle et al. at 2008 which Enroll 158 Zanzibar Pregnant Ladies at labor, they found strong association between anemia and post partum hemorrhage (Khan et al., 1997).

Severe anemia is hypothesized to impair tolerance of postpartum hemorrhage and contribute to maternal death, possibly due to the failure of women to endure such excessive blood losses and late arrival at admission (Allen, 2000, Alauddin, 1986).

In this study the mode of delivery either spontaneous vaginal delivery, augmentations of
labor, inductions of labor does not affect the amount of post partum hemorrhage with the p value 0.045 which was statistically not significant, which agree with Claudio G. Sosa et al. at 2010 in this study which done on Latin-American population shows augmentation and/or induction of labor were not associated with increased risk of postpartum hemorrhage (Bais et al., 2004, Xiong et al., 1994, Ohkuchi et al., 2003).

Our study disagrees with Geelhoed D et al. 2006 how done studies among African populations reported no association between maternal anemia and postpartum hemorrhage in among Ghanaian women (Geelhoed et al., 2006).

In this study 5 patients with severe anemia (Hb< 8 gm) develops uterine atony (inertia), in which 2 of them need hysterectomy because of uncontrolled bleeding compare with only 1 patient develops uterine atony who had hemoglobin more than 11 gram, which agree with Kaima A. Frass et al. study done in Al Thawra General hospital. Fifty-three cases were included in the study. Results: Most of the hysterectomies women 80.75% (17/21) had Hb levels ≤ 7 versus 12.5% of the non-hysterectomies patients.

5. CONCLUSIONS
The finding of this study support the association between anemia at delivery and the potential risk of PPH which remains currently debated. Also we provide evidence of the association between severe anemia and severe uterine atony requiring emergency hysterectomy.

6. RECOMMENDATION
Further studies with larger sample size to confirm these findings are required. In this group of anemic women who develop severe PPH due to uterine atony, early decision of hysterectomy to save their lives is potential and should be considered when other measures are ineffective.

Further study requires confirming associations between other risk factor for post partum hemorrhage in non-anemic pregnant lady at labor.

The result of our study highlights the need to increase the population awareness to utilize the available maternity care services along with the promotion of iron and folates supplementation for all pregnant women. The screening and therefore treatment of anemia must be essential part of antenatal care components particularly in setting where malaria and other infectious diseases are prevalent, the specific cause of anemia was not considered in this study.

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