

Indications and Risk Factors of Blood Transfusion in Obstetrics and Gynecology

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Abstract

Background: Blood transfusions, crucial for emergency obstetric care, can significantly reduce maternal mortality rates. Obstetric transfusions are often urgent and unpredictable. Common emergencies include hemorrhages from ectopic pregnancy, abortions, and placenta previa. Transfusion rates vary globally, with 0.2%-3.2% in high-resource countries and higher in low-resource areas. Despite their benefits, transfusions carry risks such as allergic reactions and infection transmission. **Aim of the study:** The study aims to ascertain the indications and risk factors associated with blood transfusions in obstetric and gynecological patients. **Methods:** This retrospective observational study at the Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, analyzed indications and risk factors for blood transfusions in obstetrics and gynecology patients over one year. It included 115 women, with 110 obstetrics and 5 gynecology patients. Inclusion criteria covered women undergoing cesarean sections, vaginal deliveries, or other gynecological treatments and those with obstetric complications like postpartum hemorrhage. Exclusion criteria included women needing transfusions after seven days postpartum or with congenital bleeding disorders. **Result:** The majority of participants (66.96%) were aged 21-30, with 85.22% from low socioeconomic backgrounds. The mean BMI was 22.55±4.07. Most women (69.57%) were in the 31-40 weeks gestational age range. Multigravida and primigravida were 51.30% and 44.35%, respectively. Over half (57.6%) were not booked for antenatal care. Cesarean sections were the most common delivery method (60.87%). Vaginal delivery was the most frequent intervention (33.91%). Blood transfusion was mainly due to postpartum anemia (39.13%). Packed cell volume was the most transfused product (62.28%). Most (94.78%) had no transfusion reactions, with urticarial rash in 2.61% of cases. **Conclusion:** The study found that blood transfusions in obstetrics and gynecology are mainly due to severe anemia, postpartum hemorrhage, and complications like placenta previa and DIC. Most transfusions occurred in women aged 21-30, primarily multigravida and unbooked patients, indicating a need for better antenatal care. Packed cell volume was the most common blood product used.

Keywords: Indications, Risk Factors, Blood Transfusion.

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INTRODUCTION

Pregnancy poses a special challenge as immune responses in pregnant and non-pregnant states

are different. Obstetric hemorrhage is defined as any blood loss associated with pregnancy or parturition which may be revealed or concealed and is likely to endanger life [1]. Hemorrhage continues to be the

leading cause of maternal mortality worldwide, accounting for 31% in Asia and 13% in developed countries [2]. In developing countries, obstetric complications are the leading indications for blood transfusion [2]. Every year, more than 500,000 women worldwide pass away either during childbirth or the postpartum phase [3]. Blood transfusion is acknowledged as one of the critical components of complete emergency obstetric treatment, which has been demonstrated to lower rates of maternal mortality due to the unexpected nature of postpartum hemorrhage. Blood transfusion facility is the backbone of this branch of medicine [4]. Normally, blood loss during birth is well tolerated because of changes during pregnancy. Obstetric transfusions tend to be urgent and unpredictable and occur in otherwise healthy women [5]. Common obstetric emergencies requiring blood and blood components transfusion include acute blood loss in the first half of pregnancy due to conditions like ectopic pregnancy rupture, complications from abortions, and vesicular moles. In the later half of pregnancy, there can be hemorrhage due to placenta previa or accidental hemorrhage. During labor, women may present with severe anemia and may develop third stage hemorrhage or other complications that result in severe blood loss and sudden deterioration in general condition [3]. Although the blood transfusion rate in some studies has been quoted as between 0.16% and 6% in obstetrics, transfusion rates vary among countries, hospitals, and doctors due to different practices [6]. In high-resource countries, the frequency of blood transfusion in obstetrics is reported to be 0.2%–3.2% [7], while a rate of 2.2% has been reported by a study in a resource-poor country like Nigeria [8]. The mainstay of blood transfusion services involves the use of whole blood and packed (sedimented) cells. At the same time, other less common practices include the use of platelet concentrates, fresh frozen plasma (FFP), and cryoprecipitate [9]. These blood transfusion practices are associated with complications, even when indicated and safety protocols are observed [6,9,10]. Blood transfusion should be done when the benefits are likely to outweigh the risks [11]. The incidence of transfusion reactions is 4 in 100 transfusions for non-hemolytic reactions and 1 in 40,000 transfusions for hemolytic reactions. The complications of blood transfusion could be allergic reactions, acute immune hemolytic reactions, delayed hemolytic reactions, and risk of transmission of infections and diseases (HIV, Hepatitis B and C) [12]. A pre-planned multi-disciplinary protocol yields the best result in management. This study was undertaken in our institute with the objective of ascertaining the indications and the risk factors associated with blood transfusions in obstetric and gynecological patients to improve patient outcomes and minimize complications.

METHODOLOGY & MATERIALS

This retrospective observational study was conducted to analyze the indications and risk factors

associated with blood transfusion in obstetrics and gynecology patients. The study was carried out in the Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh over a period of one year, from January 2020 to December 2020. A total of 115 women who received blood transfusions during their hospital stay were included in the study. Out of them, 110 participants were obstetrics patients, and 5 were gynecology patients.

Inclusion criteria:

- Women who underwent a cesarean section or vaginal delivery or other gynecological treatment.
- Women are diagnosed with obstetric complications like postpartum hemorrhage (PPH), placenta previa, placental abruption, or others.
- Patients in the immediate postpartum period (within seven days of delivery) require a blood transfusion.

Exclusion criteria

- Women requiring blood transfusion after seven days of delivery.
- Women with congenital bleeding disorder.

The study adhered to the ethical guidelines outlined in the hospital's declaration. As the study involved retrospective data, the ethical committee considered the need for written informed consent. However, all efforts were made to ensure that patient confidentiality was maintained by anonymizing the data.

Data Collection

Patients were identified through the hospital's medical records. The data was collected using a prepared proforma. A detailed history of the patient, including demographic history, medical history, surgical history, and previous blood transfusion history, was taken. Diagnosis and any surgical intervention done, if any, were noted. The indication for blood transfusion and the nature of the blood component needed for transfusion were evaluated. Post-transfusion reactions were also recorded as an outcome.

Data Analysis

Statistical testing was conducted using the statistical package for the social science system version SPSS 22.0. Continuous variables were presented as mean±SD for non-normally distributed data. Categorical variables were expressed as frequencies and percentages. All of the data were inserted in Excel and presented in tables and graphs.

RESULT

The majority (66.96%) of participants were between the ages of 21 and 30 years. Most participants

(85.22%) were from a low socioeconomic background, while only a small percentage belonged to medium (13.04%) and high (1.74%) socioeconomic groups. The mean BMI of the participants was 22.55 ± 4.07 (Table 1). 69.57% of women were in the 31-40 weeks gestational age range, with fewer in earlier stages. Multigravida and primigravida account for 51.30% and 44.35%, respectively. A significant proportion (57.6%) had not been booked, while 42.4% had received antenatal care. The majority (77.39%) had a single intrauterine pregnancy, 10.43% had multiple pregnancies, 4.35% had ectopic pregnancies, and 3.48% had abortions. Only five patients were non-pregnant (gyno). Cesarean sections were the most common mode of delivery (60.87%), with vaginal delivery accounting for 31.30% (Table 2). Table 3 shows that vaginal delivery was the most common intervention with 33.91% of cases, followed by C-sections at 22.61%. Conservative management was performed in 14.78% of

cases, and dilation and evacuation accounted for 13.04%. Exploratory laparotomy was less frequent at 9.57%, and hysterectomy was the least common intervention performed in 6.09% of cases. The common indication for blood transfusion includes postpartum anemia (39.13%), postpartum hemorrhage (20.87%), placenta previa (11.30%), DIC (9.57%), abruption placenta (4.35%), ectopic pregnancy (3.48%), and abortions and thrombocytopenia (2.61% each) (Table 4). Packed cell volume was the most commonly transfused blood product (62.28%), followed by platelets (18.42%), fresh frozen plasma (11.40%), whole blood (7.89%), and cryoprecipitate (0.88%) (Table 5). The data on transfusion reactions among the patients indicates that 94.78% experienced no reactions. Urticarial rash occurred in 2.61% of cases, chills in 1.74%, and transfusion-related acute lung injury (TRALI) was reported in 0.87% of cases (Figure 1).

Table 1: Demographic characteristics of the participants (N=115)

Variables	Frequency (n)	Percentage (%)
Age category (years)		
≤20	10	8.70
21-30	77	66.96
31-40	17	14.78
41-50	8	6.96
≥51	3	2.61
Socioeconomic status		
Low	98	85.22
Medium	15	13.04
High	2	1.74
BMI (Mean ± SD)	21.75 ± 5.07	

Table 2: Obstetric characteristics of the participants (N=115)

Variables	Frequency (n)	Percentage (%)
Gestational age (weeks)		
<10	8	6.96
11-20	11	9.57
21-30	10	8.70
31-40	80	69.57
>41	1	0.87
Gravida		
Primigravida	51	44.35
Multigravida ≥2	59	51.30
Booking status		
Booked	49	42.4
Unbooked	66	57.6
Type of pregnancy		
Abortion	4	3.48
Ectopic	5	4.35
Multiple pregnancies	12	10.43
Single intrauterine pregnancy	89	77.39
Non-pregnant (gyno)	5	4.35
Mode of delivery		
Vaginal delivery	36	31.30
Cesarean section	70	60.87

Table 3: Distribution of cases based on the type of intervention/surgery

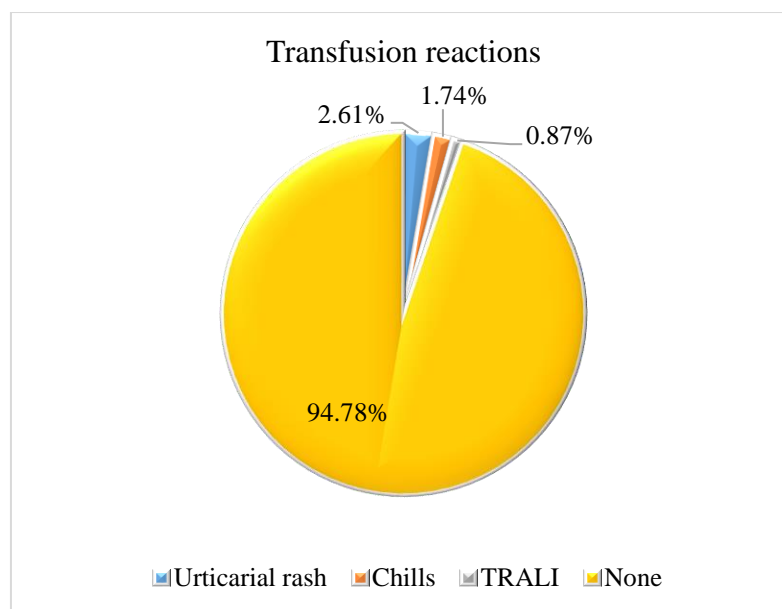
Type of intervention	Frequency (n)	Percentage (%)
Vaginal delivery	39	33.91
C-Section	26	22.61
Dilation and evacuation	15	13.04
Exploratory laparotomy	11	9.57
Hysterectomy	7	6.09
Conservative management	17	14.78

Table 4: Distribution of patients according to the indication for blood transfusion

Indications	Frequency (n)	Percentage (%)
Postpartum hemorrhage	24	20.87
Abruptio placenta	5	4.35
Placenta previa	13	11.30
Abortions	3	2.61
Ectopic pregnancy	4	3.48
Vesicular mole	2	1.74
Severe anemia during pregnancy/postpartum anemia	45	39.13
DIC	11	9.57
Thrombocytopenia	3	2.61
Others	5	4.35

Table 5: Total blood and blood products transfused

Types of blood and components	Frequency (n)	Percentage (%)
Packed cell volume	71	62.28
Whole blood	9	7.89
Platelets	21	18.42
Fresh frozen plasma	13	11.40
Cryoprecipitate	1	0.88

**Figure 1: Post transfusion reactions among patients (N=115)**

DISCUSSION

In obstetrics and gynecology, blood transfusions play a critical role in managing conditions that involve significant blood loss or anemia, particularly during pregnancy, childbirth, and gynecological surgeries. The overall rate of blood

transfusion in obstetrics and gynaecology in Bangladesh is 9.23% [13]. The indications for blood transfusion in this field typically include hemorrhage, severe anemia, and obstetric complications such as placenta previa, postpartum hemorrhage, and ectopic pregnancies. These conditions pose serious risks to

maternal and fetal health, often necessitating timely intervention. However, transfusions carry inherent risks, including transfusion reactions, infections, and immune complications, which underscore the importance of careful patient evaluation and adherence to clinical guidelines. The most common age group for transfusion in this study is between 21-30 years (66.96%). This is similar to a study done by Chowdhary *et al.* where the transfusion rate was 9.23%, and the common age group was from 21-30 years (76.58%) [13]. The average BMI of women is 21.75 kg/m². The majority of transfusions were done for patients of gestational age 31-40 weeks (69.57%). A similar observation was made by Chawla *et al.* In their study, 23 (71.8%) women were in 31-40 weeks of pregnancy [6]. A notable finding is the predominance of multigravida patients (51.30%) compared to primigravida (44.35%), which is consistent with the result of Shridevi *et al.* [14]. Among obstetric patients who received blood transfusions, (42.4%) were booked, and (57.6%) were unbooked. This is in accordance with an observation made by Chowdhary *et al.* [13]. The pregnant received a significantly higher transfusion than the non-pregnant patient. Amongst the pregnant receiving blood transfusion, the majority of them were single intrauterine gestation (77.39%). Amongst the pregnant patients, the least common type of pregnancy receiving transfusion was multiple pregnancies. Shridevi *et al.* found 78.63% singleton, 12.52% twins, 4.97% ectopic pregnancies and the rest of them as abortions [14]. The rate of transfusion is more in women who delivered by caesarean section (60.87%) than vaginal deliveries (31.30%). A study by Butwick *et al.* has shown that caesarean delivery is an important risk factor for transfusion [15]. The cases receiving blood transfusions were either managed medically or surgically. The 14.78% were treated medically, while most of them had an intervention involved in their management. Besides vaginal delivery and cesarean section, other surgical interventions involved were dilatation and evacuation, exploratory laparotomy and hysterectomy in our observation. In the present study, it was observed that severe anaemia, either during pregnancy or during the postpartum period, was the most common indication (39.13%) for transfusion. Postpartum hemorrhage (20.87%), placenta previa (11.30%), DIC (9.57%) and ectopic pregnancy (3.48%) were other common indications. Less common indications were abortions, vesicular moles, thrombocytopenia, etc. The results of our study are comparable to the study done by Bengal *et al.* [16]. According to our study, 62.28% of patients were transfused PCV, 18.42% of patients received platelets, and 11.40% received fresh frozen plasma. Very small percentages of patients were transfused with whole blood (7.89%) and cryoprecipitate transfusion. Patel *et al.*, in their study, reported that 80% of patients were transfused with PCV only, and 20% of patients received a combination of blood and blood products like FFP, PRC, and Cryoprecipitate [17]. Our study found that

5.22% had a transfusion reaction. A study conducted by Deshpande *et al.* reported that 9 out of 204 women (4.41%) had a transfusion reaction, among which 1.47 had an urticarial rash, 1.47% had chills, and 1.47% had transfusion-related acute lung injury [18]. In obstetric emergencies, packed red blood cells are preferred over whole blood for transfusions, as whole blood can increase plasma volume and lead to circulatory overload. Fresh frozen plasma plays a critical role in managing accidental hemorrhage and cases of severe blood loss, helping to prevent or control serious complications such as disseminated intravascular coagulation (DIC). Additionally, it aids in preventing other issues like acute renal failure and shock. Transfusion is typically required when hemoglobin levels drop below seven g/dL [19]. The majority of patients who received transfusions were unbooked, highlighting insufficient antenatal care, poor nutrition, and a lack of awareness regarding the importance of hematinic therapy. Early involvement of a consultant obstetrician, anesthetist, hematologist, and blood bank is crucial. According to the World Health Organization, the four key elements of a safe and effective blood donation service include a well-organized system, voluntary donations, thorough blood testing, and minimizing unnecessary transfusions [20].

Limitations of the study: Several limitations exist. The sample size of 115 women is relatively small and may not represent the broader population. Potential confounding factors, such as variations in clinical practices and patient management, were not controlled. Lastly, the exclusion of women with congenital bleeding disorders may have omitted a critical subset of patients.

CONCLUSION

The study concludes that blood transfusions in obstetrics and gynecology are primarily driven by severe anemia, postpartum hemorrhage, and complications like placenta previa and disseminated intravascular coagulation (DIC). The most common age group for transfusion was 21-30 years, and multigravida women were more frequently transfused than primigravida women. The majority of transfusions were administered to unbooked patients, indicating a need for better antenatal care and nutritional support. Packed cell volume was the most frequently transfused blood product.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee.

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