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Original Research Article

Indications and risk factors of blood transfusion in obstetrics and gynaecology

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ABSTRACT

Background: Blood transfusion services are vital to maternal health because obstetric hemorrhage has been the foremost cause of maternal mortality in India**.** The purpose of the study is to study the indications and risk factors of transfusion of blood products in patients of obstetrics and gynaecology. The secondary objective is to study the type of early post blood transfusion reactions and percentage of patients referred from peripheral centre due to non-availability of blood transfusion centres
Methods: A prospective cohort and observational study at Deen Dayal Upadhyay hospital, a New Delhi, India.
Results: 21 to 30 years was the most common age group to receive blood transfusion. The 86.70 percent of the subjects requiring transfusion were of low socioeconomic status. 57.60 percent were not booked at any institute. The 60% of the patients were referred from elsewhere. Chronic anemia was most common associated haematological comorbidity (15.20%). The 85% received single component therapy transfusion. Amongst the patients receiving transfusion 11.2% had gynaecological disorder. The most common indication for transfusion was anemia in pregnancy. The 98.40% of the patients had no immediate or delayed blood transfusion reaction.
Conclusions: Anemia in pregnancy is most common and important cause of transfusion of blood in antenatal population in Northern India. Anemia is a preventable condition. Operational blood storage systems at peripheral centres can reduce referral to tertiary care centre for blood transfusion. Transfusion of cross matched and screened blood components under supervision is extremely safe.

Keywords: Obstetric hemorrhage, Blood transfusion, Blood transfusion reaction, Anaemia

INTRODUCTION

Blood transfusion services are essential to maternal health because, despite pregnancy being a physiological state, it can turn pathological suddenly and unexpectedly if left untreated. 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 mole. 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.

To reduce maternal mortality, adequate and safe blood transfusions together with its components must be provided quickly. In the treatment of PPH in particular and obstetric hemorrhage in general, the use of blood and its constituents has emerged as a potentially life-saving tactic.

Pregnancy-related anemia is defined as hemoglobin concentrations of less than 10.5 gm/dl in the second trimester and 11 gm/dl in the first and third trimesters. Clinical and haematological considerations should be

taken into account when deciding for transfusion (British committee for standards in hematology).[1] In order to lower the rate of maternal morbidity and death, transfusion is nearly always recommended when hemoglobin is less than 7 gm/dl (Reveiz et al).[2] In India, anemia is prevalent in around 65-75% of the population (DeMayer and Tegman).[3]

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. Patients usually present with shock which requires urgent blood and its components transfusion. According to sample registration survey (1997-2003), postpartum hemorrhage accounts for nearly 38% of all maternal deaths (Registrar General of India).[4]

Because of the approximately 50% hypervolemia associated with pregnancy, managing obstetric hemorrhage is more difficult than managing hemorrhage in non-pregnant patients. Hypovolemia symptoms appear somewhat later due to pregnancy-related physiological changes. Visual estimations of vaginal bleeding do not accurately indicate the magnitude of intravascular volume deficit (Rock and Thomson).[5]

Every year, more than 500,000 women worldwide pass away either during childbirth or the postpartum phase. Blood transfusion is acknowledged as one of the ninth 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 (Chandy).[6]

For blood to be available to those in need and to reduce the danger of transfusion-transmitted infections and transfusion responses such as allergic reactions, acute immunological hemolytic reactions, delayed hemolytic reactions, etc., it must be used appropriately and sensibly.

In order to lower maternal morbidity from bleeding and, consequently, lower the rate of maternal death, efforts should be made to ensure that blood transfusion facilities are promptly available and well-maintained in developing nations such as India. The present study was designed to study the indications and risk factors of blood transfusion in obstetrics and gynaecology.

During the hospital stay of the patient, the outcomes of the study were measured in following terms.

Indications for blood transfusion, no. of units of blood products transfused, no. and nature of acute post transfusion reactions occurred, no. of single unit transfusions done and no. of patients referred to our hospital for blood transfusion.

METHODS

This was a prospective cohort and observational study conducted over a period of time from February 2020 to January 2021 at Deen Dayal Upadhyay hospital, a tertiary referral care centre in new Delhi, India. The study population included all patients who received transfusion with any blood component in the department of obstetrics and gynecology. Consent for the study was obtained from each participant. The data was collected using a prepared proforma meeting the objective of the study and personal interviews of the patients after taking the informed consent. A detailed history of the patient including medical history, surgical history, previous blood transfusion history was taken and general physical, local examination was performed for all the patients. Diagnosis and any surgical intervention done, if any, were noted. The first point of contact in a health set up was enquired and reason for referral to tertiary care hospital was noted (if referred). Indication for blood transfusion, nature and number of blood component needed for transfusion was evaluated. Informed consent was obtained before blood transfusion. Blood requisition form was filled in which the details of the patient, diagnosis, indication of transfusion, blood group, hemoglobin, platelet count, previous history of transfusion, post transfusion reactions if any previously, and sent to blood bank along with 2ml blood sample of the patient in EDTA vial for blood group cross-matching. After receiving blood, details were crosschecked with the patient details and the requisite checklists were filled before transfusion. The participants were observed for acute post-transfusion reactions (up to 24 hours) and the checklist duly filled if any acute post transfusion reaction were noted.

Statistical testing was conducted with the statistical package for the social science system version SPSS 17.0. Continuous variables were presented as mean±SD or median (IQR) for nonnormally distributed data. Categorical variables were expressed as frequencies and percentages. The comparison of normally distributed continuous variables between the groups (indications present or absent) was performed using Student's t test. Nominal categorical data between the groups was compared using Chi-squared test or Fisher's exact test as appropriate. Non-normal distribution continuous variables were compared using Mann Whitney U test. For all statistical tests, a p value less than 0.05 were taken to indicate a significant difference.

RESULTS

The study was conducted over 1 year and 125 subjects receiving blood transfusion were included. The majority of females who received blood transfusion were in the age group 21 to 30 years (67.20%) followed by 31 to 40 years (18%). The age group that received least transfusion was above 50 years. The maximum number of subjects belonged to low socioeconomic status (86.70%). The 57.60% of the patients were not booked at our institute or elsewhere. 60 percent of the patients receiving transfusion were referred to our center.

The pregnant received significantly higher transfusion than non-pregnant patient. Amongst the pregnant receiving

blood transfusion, majority of them were single intrauterine gestation (66.4%) followed by those who had a miscarriage (12.8%). Amongst the pregnant patients the least common type of pregnancy receiving transfusion was multiple pregnancy.

Table 1: Characteristics of patients who received blood transfusion.

Variables	N (%)
Age category (years)	
≤20	11 (8.80)
21-30	84 (67.20)
31-40	18 (14.4)
41-50	9 (7.20)
≥51	3 (2.4)
Socioeconomic status	
Low	107 (85.6)
Medium	16 (12.8)
High	02 (02)
Parity/gravida	
Primigravida	53 (42.40)
Multigravida ≥2	60 (48.00
Non pregnant (gyne)	12 (9.60)
Booking status	
Booked	53 (42.40)
Unbooked	72 (57.60)
Mode of delivery	
Vaginal delivery	42 (33.60)
Cesarean section	28 (22.40)

Table 2: Distribution of patients based on type of pregnancy.

Type of pregnancy	N	Percentage (%)
Abortion	16	12.80
Ectopic	08	6.40
Multiple pregnancies	04	3.20
Single intrauterine pregnancy	83	66.40
Non-pregnant	14	11.20

Amongst the patient receiving transfusion, existing medical co morbidities were also studied. 67.20% did not have any associated medical comorbidity. In those who had, haematological co morbidity was most frequently observed, the most common being chronic anemia (15.20%) followed by thrombocytopenia (10.40%). Only 1.60% of the recipients were found to have thalassemia. Anemia being the most common associated haematological comorbidity, the cause of anemia was also studied. It was observed that lack of iron usage due to either poor nutrition or non-compliance to oral iron medication was the most common cause (27.20%).

After lack of iron usage, miscarriage and abnormal uterine bleeding were the second most common cause of anemia observed (12% each). The other factors less commonly observed were, hemorrhage in pregnancy, ectopic pregnancy, and HELLP syndrome.

Table 3: Distribution of cases according to the cause of anemia.

Cause of anemia	N	Percentage (%)
Lack of iron usage	34	27.20
Abortion	16	12.8
Post-partum hemorrhage	10	08.00
Ante partum hemorrhage	08	6.4
Ectopic pregnancy	08	6.4
Previous CS with anemia	09	7.2
HELLP	06	4.8
Abnormal uterine bleeding	15	12
Miscellaneous	19	15.2

The cases receiving blood transfusion either were managed medically or surgically. The 14.40% were treated medically, while most of them had an intervention involved in their management. The most common intervention observed was vaginal delivery. 1/3 of the total cases have had a vaginal delivery. Around one fifth of the patients have had undergone a casarean section. The other surgical interventions involved were dilatation and evacuation, exploratory laparotomy and hysterectomy.

Table 4: Distribution of cases based on the type of intervention/surgery.

Type of intervention	N	Percentage (%)
Vaginal delivery	42	33.60
C-Section	28	22.40
Dilation and evacuation	17	13.60
Exploratory laparotomy	12	9.60
Hysterectomy	08	6.40
Conservative management	18	14.40

Prior to transfusion, the blood samples of the patient were sent and hemoglobin, platelet count and INR was recorded. Based on the hemoglobin values the study population was divided into three groups-less than 7 gm/dl, 7 to 9 gm/dl, more than 9 gm/dl.

Table 5: Distribution of patients according to laboratory values before blood transfusion.

Lab values		N	Percentage (%)
Hemoglobin, (n=104)	<7	59	56.75
	7-9	39	37.50
	>9	06	05.76
Platelet count, (n=23)	<50,000	04	17.39
	50,000-1,00,000	19	82.60

More than half of the patients (56.75%) had hemoglobin less than 7 gm/dl, while only 5.76% of the patient's required transfusion at a level of hemoglobin greater than 9 gm/dl.

Based on the platelet count, the recipients were divided into 2 groups-less than 50,000 and 50,000-1,00,000. The 82% of the patients fell into the second group, (71% had INR. 1.5)

The patients in the study received transfusion of either a single component such as packed red cell, or platelet rich plasma, or fresh frozen plasma. Or received transfusion with multicomponent therapy. Majority of the patients (85%) received single component therapy, packed cell being the most common component, i. e. around 70.4 percent. This was next followed by platelet rich plasma and fresh frozen plasma in single component therapy, 15% of the patients received multiple component therapy.

Table 6: Distribution of patients based on type of blood product transfused.

Type of blood product transfused	N	Percentage (%)
Packed RBCs	88	70.40
Platelet rich plasma	17	13.60
Fresh frozen plasma	02	01.60
Combined transfusions	18	14.40

Based on the total number of products transfused to a single patient, the transfusion was categorized as minimum, moderate and massive transfusion. The minimum transfusion group involved giving 4 or less transfusion to a single patient. Majority of the patients fell into this group i.e., 83.2 percent of the patients received transfusion of 4 or less components.

In moderate transfusion, patients receiving 5-9 units of the component therapy were included. Only 13 patients (10.40%) were included in this group. Massive transfusion involved transfusing 10 or more blood products. Amongst the 125 patients in study, massive transfusion was received by 6.4 percent of the recipients, which is the least amongst the three groups.

Table 7: Distribution of patients according to number of blood products transfused.

No. of units transfused	N	Percentage (%)
Massive (≥10 units)	08	6.40
Moderate (5-9 units)	13	10.40
Minimum (≤4 units)	104	83.20

Amongst the patients receiving blood transfusion 11.2% had gynecological disorder.

Multiparous patient in the age group 31 to 40 years received significantly more transfusion as compared to other groups. In primiparous patient the most common indication of transfusion was ectopic pregnancy followed by anemia in pregnancy. In multiparous patient the most common indication of blood transfusion was postpartum hemorrhage. In gynecological patients, the most common indication was AUB. Amongst pregnant patient, irrespective of parity, anemia in third trimester leads to maximum number of transfusions followed by casarean section.

Table 8: Distribution of patients according to the indication for blood transfusion.

Indication	N	Percentage (%)
Abortion	16	12.80
Anemia in pregnancy	34	27.20
Chronic anemia	19	15.20
Post-partum hemorrhage	10	08.00
Antepartum hemorrhage	08	06.40
HELLP	06	04.80
Ectopic pregnancy	08	06.40
Intraoperative blood loss	09	07.20
Abnormal uterine bleeding	15	12.00

After transfusion, the patients were observed for any transfusion reaction within-hours of transfusion. Only 2 cases developed mild reaction to transfusion, single patient developed fever and second patient developed chills. No major transfusion reaction was noted in any of the cases in our study.

Table 9: Distribution of cases based on immediate post transfusion reactions.

Immediate post transfusion reaction	N	Percentage (%)
Fever	01	0.80
Chills	01	0.80
None	123	98.40

DISCUSSION

In our study of 125 patients who received blood transfusion, pregnant women, especially primigravida in the age group of 21-30 years had higher number of indications for blood transfusion, when compared to other age groups. In a study on transfusion practice in obstetric hemorrhage in a tertiary care centre, maximum number of patients were in the age group of 20-29 years which is almost similar to our study.[7]

In our study, non-pregnant females of more than 50 years of age had increased requirement of blood transfusion. Among under 20 years of age pregnant patients, third trimester was significantly associated with blood transfusion, and most of them had a single intrauterine pregnancy.

In a similar study conducted at a tertiary care hospital the common indications for blood transfusion were caesarean section, anaemia in pregnancy, antepartum hemorrhage, abortion, ectopic pregnancy.[8] This is almost similar to our study, where anemia in pregnancy was the most common indication for transfusion followed by transfusion due to caesarean section. In the study by Abdoul-Samadou et al hemorrhagic abortion was the main indication for blood

transfusion.[9] Unlikely, in a study by Vaid et al found that obstetric hemorrhage was the most common indication for transfusion.[10]

In our study it was found that lack of iron usage antenatally (nutritional deficiency) was the most common cause of anemia and blood loss due to abortion was the second most common cause of anemia. AUB was the third most common cause of anemia overall and in gynaecological patients.

In our study, severe anemia (Hb <7 gm%) was observed among more than half of the pregnant before packed red blood cell transfusion. Majority of patients before platelet transmission had a platelet count ranging from 50000 to 100000 cumm.

In a similar study conducted by Vaid et al packed red cells were most commonly transfused blood products.[10] In a study by Biswas and Rengaraj showed that a total of 202 units were transfused for 70 women and majority were packed cells followed by FFP.[11] The current study showed that packed red blood cells was transfused among majority of patients followed by platelets, fresh frozen plasma and combined products transfusion.

The study by Thurn et al showed that out of 5,71,874 deliveries, massive blood transfusion occurred in 277 women, for an incidence of 5.3 per 10,000 deliveries, and increased by 30% ($p<0.001$) between the first and the second half of the study period.[12]

In this study, most of the patients received transfusion of less than 4 blood products followed by moderate transfusion of 5-9 blood products and massive transfusion ≥10 blood products.

Anjali et al studied the indications of blood transfusion, use of whole blood and blood components and measures taken to minimize the need of blood transfusion.[13] The indications in obstetric cases are evenly distributed between three-anaemia complicating pregnancy, obstetric hemorrhage and postpartum correction of anaemia. In Gynaecology, majority of the subjects (received blood transfusion for preoperative correction of anaemia in cases of abnormal uterine bleeding, whole blood transfusion was given for correction of anaemia as compared to our study similarly, anemia in pregnancy is most common indication of blood transfusion in obstetric patients, whereas abnormal uterine bleeding is the most common indication for transfusion of blood products in gynecological patients.

Patients referred to our hospital only for blood transfusion are more and can be decreased by arranging blood storage at peripheral centres only.

Immediate blood transfusions like fever, rash, itching are present in few patients but not significant for which particular cause could not be found.

CONCLUSION

Blood transfusion is one of the life-saving interventions in obstetric practice. It is recognised as one of the eight essential components of comprehensive emergency obstetric care, which has been shown to reduce maternal mortality. Globally, hemorrhage remains one of the most common and preventable causes of maternal mortality worldwide. Contrary to this, in our study, anemia was found to be the most common cause of transfusion. Recent data as per NHFS 4 shows that anemia affects 53% of women in reproductive age group and 50% of pregnant women in the country. The govt. of India has been addressing the problem of anemia through various initiatives and campaigns.

Reducing the prevalence of anemia can in turn lead to reduction in need of blood transfusion. This can be done by preventing and treating anemia from adolescence or even earlier in childhood and ensure that women embark on pregnancy in a stage where iron stores are within normal range. Also, the importance of consuming iron rich food along with enhancers in diet, avoiding food that decrease absorption of iron, taking prophylactic iron folic acid tablets, deworming with albendazole, regular screening in antenatal clinics for anemia should be emphasized. Intravenous administration of newer iron preparations is safe and effective modality, can also help to decrease blood transfusion. At the time of delivery active management of third stage of labour, prompt recognition and management of traumatic or atonic PPH can help to decrease the need of blood transfusion and its component. The above said strategies are cost effective, easy to implement and would result not only in decreasing the referral burden on tertiary health care centres for blood transfusion but also decrease the risk of morbidity and mortality associated with blood transfusion.

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REFERENCES

1. Murphy MF, Wallington TB, Kelsey P, Boulton F, Bruce M, Cohen H, et al. Blood Transfusion Task Force. Guidelines for the clinical use of red cell transfusions. Br J Haematol. 2001;113(1):24-31.
2. Reveiz L, Gyte GM, Cuervo LG. Treatments for iron-deficiency anemia in pregnancy. Cochrane Database Syst Rev. 2007;10:CD003094.
3. DeMayer EM, Tegman A. Prevalence of anaemia in the world. World Health Organ Qlty. 1998;38:302-16.
4. Registrar General of India. Sample registration survey. Maternal mortality in India: 1997-2003, trends, causes and risk factors. In: Registrar General of India, eds. A Survey. New Delhi: Registrar General of India; 2006:29
5. Rock JA, Thomson JD. Te Linde's operative

gynecology. 8th ed. Philadelphia: Lippincott-Raven; 1997:245-61.
6. Chandy BK. WHO fact sheet. Kuwait Med J. 2007;39(3):298-302.
7. Dickason LA, Dinsmoor MJ. Red blood cell transfusion and cesarean section. Am J Obstetr Gynecol. 1992;167(2):327-32.
8. Agarwal M, Rongmei L, Agarwal S, Rajkonwar J. Blood Transfusion Trends In Obstetrics: Hospital Based Study. J Med Health Sci. 2021;11(04):1633-8.
9. Abdoul-Samadou A, Baguilane D, Akila B, Dédé RDA, Kossi-Edem LA, Kokou D, et al. Blood Transfusion Practices at the Gynecology-Obstetrics Department of the Sylvanus Olympio University Hospital in Lomé: A Study of 254 Cases. Open J Obstetr Gynecol. 2012;9(4):494-501.
10. Vaid P, Kapoor B, Kapoor M, Kapoor BB. Role of blood and blood components transfusion in obstetric emergencies. Int J Reprod Contracept Obstet Gynecol. 2020;9(5):2029-34.
11. Biswas S, Rengaraj S. Pattern of Blood Transfusion among Women undergoing Caesarean Section in a Tertiary Health Care Centre in South India. J Gynec Obstet. 2019;2(1):029.
12. Thurn L, Wikman A, Westgren M, Lindqvist PG. Massive blood transfusion in relation to delivery: incidence, trends and risk factors: a population-based cohort study. BJOG. 2019;126(13):1577-86.
13. Anjali K, Varsha K, Sulabha J. Blood transfusion in Obstetrics and Gynaecology: A retrospective analysis. Panacea J Med Sci. 2015;5(3):109-12.

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