

## Original research article

# Clinical profile of obstetric patients undergoing transfusion at a tertiary care centre

<sup>1</sup>DR. SURBHI GUPTA, <sup>2</sup>DR. DEEPTI DAHIYA, <sup>3</sup>DR. MENKA VERMA, <sup>4</sup>DR. DAYA SIROHIWAL

<sup>1</sup>ASSISTANT PROFESSOR, DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, PGIMS ROHTAK

<sup>2</sup>ASSISTANT PROFESSOR, DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, PGIMS ROHTAK

<sup>3</sup>ASSISTANT PROFESSOR, DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, PGIMS ROHTAK

<sup>4</sup>SENIOR PROFESSOR & HEAD, DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, PGIMS ROHTAK

Corresponding author: DR. SURBHI GUPTA – ASSISTANT PROFESSOR, DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, PGIMS ROHTAK

## ABSTRACT:

**Objective:** To study the transfusion practice in obstetric patients including indications, adverse events, types of blood components usage and their demographic profile.

**Method:** This is a retrospective observational study of all obstetric patients who had undergone transfusion of blood or its components in one year.

**Results:** Out of 10914 total patients 1473 patients underwent transfusion. Out of 1473 patients 73.3% were antenatal and 78% patients were below 30 years of age. The commonest indication for transfusion was anaemia 48%. 68.23% patients required >1 unit of PRBC's. Out of 6259 transfusions 0.8% developed transfusion related adverse event.

**Conclusion:** Anaemia in pregnancy is the commonest cause of blood transfusion in Indian subcontinent which can be prevented by timely treatment. The decision to perform a blood transfusion should be made on both clinical and haematological grounds which reduces wastage of blood and adverse events.

## INTRODUCTION:

A normal Haemoglobin level is a must for a healthy pregnancy and healthy new born at time of delivery. Severe anaemia, pregnancy related complications and disorders of labour present as risk factors for extra blood loss during pregnancy and cause severe hemodynamic instability. Timely availability and right choice of blood or blood component can save two or more precious lives. The reported transfusion rate in obstetrics varies from 0.16 to 2–6%. The rates are more in women with abnormal labour and deliveries. The rates for transfusion also vary and show regional variation, different practices of different hospitals and different clinicians. Studies have stated that junior doctors and surgical specialists are more likely to transfuse patients than physicians and anaesthesiologists<sup>[1–3]</sup>.

This study was undertaken with the objective to ascertain the total patients receiving transfusion, indications for transfusion, various blood components used, timing of transfusion and the presence of any risk factors in the patients transfused (clinical and demographic profile).

**MATERIAL AND METHODS:**

This was a retrospective observational study carried out from Jan 01, 2021–Dec 31, 2021 at a tertiary care teaching hospital in the Department of Obstetrics and Gynaecology (a high case load centre). All the women attending the antenatal and abortion services in IPD formed the study population; the study group included all the patients who were transfused with blood & its components during this period. The data collected was analysed and tabulated.

**RESULTS:**

**Table 1. Demographic characteristics**

Characteristic	%	N
<b>Age (years)</b>		
<21	12%	1310
21–30	73%	7969
31–40	13%	1416
>40	2%	219
<b>Parity</b>		
Primigravida/primipara	60%	6549
Multigravida	40%	4365
<b>Gestational age (weeks)</b>		
<11	1.5%	163
11–20	3.3%	361
21–30	10%	1091
31–40	82%	8950
>40	3.2%	349
<b>Type of pregnancy</b>		
Ectopic	0.8%	87
Abortion	4%	437
Intrauterine pregnancy	95.2%	10390
<b>Number of fetus</b>		
Singleton	92%	10040
Twins	7.5%	819
Triplets & Quadruplets	0.5%	55
<b>Mode of delivery</b>		
Vaginal delivery	68.66%	7134
Operative vaginal delivery	1.28%	133
Caesarean	30.06%	3123

**Table 2. Type of Blood and Blood products transfused**

Blood product type	%	N =6259
PRBC	51%	3220
FFP	24%	1489
Platelet concentrate	15.8%	980
Cryo-precipitates	0.2%	12
WHOLE BLOOD	9%	558

**TABLE 3. Shows distribution of patients as per their age groups receiving blood transfusion**

Age group	Percentage %	Number of patients =1473
<21	16%	236
21–30	62%	913
31–40	21%	309
>40	1%	15

**Table 4. Timing of blood transfusion (N= 1473)**

ANTENATAL	73.3%	N=1079
POSTNATAL	26.7%	N=394

**TABLE 5: Indication for blood transfusion in obstetrics in antenatal period**

Indications of blood transfusion	Percentage%	Number of patients = 1079
1. Pregnancy with anaemia	48%	518
2. Antepartum haemorrhage	12.5%	135
3. Lower segment caesarean section	19.5%	210
4. Abortion	4.8%	52
5. Ectopic pregnancy	15.2%	164

**TABLE 6: Indications of blood transfusion in the postpartum period**

Indications of blood transfusion	Percentage%	Number of patients = 394
1. Post vaginal delivery with PPH	20%	77
2. Post vaginal delivery with anaemia	28%	109
3. Post LSCS with PPH	4%	16
4. Post LSCS with Anaemia	16%	64
5. Post LSCS with kidney Disease	4%	16
6. Caesarean Hysterectomy	16%	64
7. Retained placenta	12%	48

**TABLE 7: Haemoglobin level at the time of blood requisitions forms were sent for PRBC**

Haemoglobin	Percentage%	Number of patients (N=1473)
<4 g/dl	31.3%	461
4-7 g/dl	53.2%	784
7-9 g/dl	13.7%	201
>9 g/dl	1.8%	27

**TABLE 8: Numbers of blood transfusions (PRBC) required by individual**

No. of blood transfusion	Percentage	N = 1473
1	31.77%	468
2	42.3%	623
3	9.6%	141
>=4	16.34%	241

**TABLE 9: Number of patients requiring massive blood transfusion (>=5 units of PRBC)**

Indications	% of total patients requiring massive transfusion	N=62
Caesarean Hysterectomy	42.8%	27
Post partum Haemorrhage	14.2%	9
Ante partum Haemorrhage	28.5%	17
Laparotomy for ectopic pregnancy	14.5%	9

**TABLE 10: Transfusion related adverse events**

Adverse effects	% of total adverse events	N=52
<u>Mild</u> (Fever, rash)	86.5%	45
<u>Moderate</u> (Fever, rash & electrolyte abnormalities, haemolysis)	11.5%	6
<u>Severe</u> (TRALI, coagulation abnormality, metabolic acidosis, hypotension and shock)	2%	1

## DISCUSSION

The main principle for the transfusion practice in medicine state that transfusion should only be used when the benefits outweigh the risks. The different components of the blood play different functions, and there is a need to realize that the component therapy is the need for the present day. The blood component therapy should not be just started on the basis of one investigation like Hb or platelet count, but the clinical profile of the patient, present condition, possibility of rebleed, comorbidities, expected surgical outcome, coagulation abnormalities etc<sup>[4]</sup> should also be the guiding factor. During the study period, the incidence of blood product transfusion for obstetric patients in our institution was 13.5% which is high in comparison to previously reported studies: 0.3–1%<sup>[5,6]</sup> by James in Europe and a Japanese center. In our study, the demographic characteristics observation [Table 1] showed most of the antenatal patients were in 20–30 year age group, primigravida having singleton intrauterine pregnancy and presenting in 30–40 weeks of gestational age. The most of these observations are in line with data from major tertiary care hospitals.<sup>[7]</sup>

The most commonly transfused blood product is Packed RBC's (51%) [Table 2] followed by FFP (24%). Each bag of packed RBCs has 150–200 ml RBCs and 75 ml plasma with a haematocrit of around 60%. These are indicated when we have insufficient RBCs in circulation or there is decrease in oxygen-carrying capacity of blood.

Whole blood transfusion accounts for 9% of total units transfused. Alexander *et al.*, in an observational study of massive obstetric haemorrhage at Parkland hospital, showed whole blood to be superior to PRBCs or combined transfusions in preventing acute tubular necrosis and other complications.<sup>[8]</sup> The availability of fresh warm blood in developing countries could provide an alternative to more expensive and infrastructure-dependent blood components.<sup>[9]</sup> Whole blood replaces many coagulation factors, and its plasma expands blood volume. It has the added advantage of exposing the patient to fewer donors.

As FFP being transfused in multiple units in each patient, it accounts for 24% of total units transfused. FFP is used in correction of microvascular bleeding, multiple coagulation factor deficiencies, massive transfusion with coagulation abnormalities and platelet concentrates when the platelet counts fall below 20,000/mm<sup>3</sup>. One unit of platelets increases the platelet count by 5000–7000/l. There is no role of prophylactic platelet transfusion; one needs to investigate and treat the cause. If the coagulation profile is not available, four units of FFP are given for four units of blood transfused within 24 hr<sup>[10,11]</sup>.

Most of the blood components were transfused in 21–30 year age group as they comprise the largest group of patients. 73.3% of transfusions were done in antenatal patients. [Table 3 & Table 4]. The indications for PRBC transfusion in antenatal patients were anaemia (48%), LSCS (19.5%), APH (12.5%), ectopic pregnancy (15.2%) & Abortion (4.8%) [table 5]. Anaemia is prevalent in antenatal patients frequently and at levels which require blood transfusions. In a study on retrospective analysis of blood transfusion in obstetrics, the common indications for blood transfusion were anaemia, obstetrics haemorrhage, abortion, ruptured ectopic<sup>[12]</sup>, which are similar to the indications necessitating blood transfusion in our centre.

The indications for PRBC transfusion in postnatal patients were post vaginal delivery with PPH (20%) post vaginal delivery with anaemia (28%), LSCS with PPH (4%), LSCS with anaemia (16%), Retained placenta (12%), and LSCS with kidney disease (4%) and caesarean hysterectomy (16%).

In a study carried out in Sweden, in pregnant women who received blood transfusion, major risk factors apparent before delivery were abnormal placentation, preeclampsia, placental abruption and previous caesarean section. Risk factors at the time of delivery were uterine rupture, atonic uterus and caesarean delivery<sup>[13]</sup>. These risk factors were similar to the indications for which transfusions were done in our study population. Obstetric haemorrhage is the commonest cause of maternal death, causing one-fourth of maternal deaths yearly<sup>[14]</sup>. Massive and life-threatening obstetric haemorrhage occurs in 3–5% and 0.1%<sup>[14-16]</sup> of deliveries, respectively, and blood product transfusion is required in 0.3–1%<sup>[14, 15]</sup>.

Haemoglobin level was <7 g/dl at the time when PRBC request form was sent in 84.5% of total requests [Table 7]. Only 1.8% of patients had haemoglobin >9 g/dl at the time of request forms were sent. The transfusions in these cases were done in view of upcoming major surgery and expected moderate-heavy blood loss during labour, surgery or other probable complications.

Anaemia during pregnancy is significant cause of maternal mortality and morbidity. The decision for transfusion was done in this study when the Hb <7 gm%, and there were < 4 weeks for delivery or in labour. This trigger for transfusion of blood has been controversial, and the Cochrane review favours the restrictive transfusion policy for the safety of the patients<sup>[17]</sup>.

In a study it was identified that patients delivered by caesarean section who had antepartum bleeding and low pre-operative haemoglobin were the only significant independent predictors for the need of blood transfusion<sup>[1]</sup>. In a study conducted by Anjali et al<sup>[18]</sup> they found that increased used of intravenous iron sucrose in antenatal period minimized the need of transfusion. Similar observations were made in our study where most of the patients who required 1 blood transfusion were those patients of moderate to severe anaemia where rest of the haemoglobin deficiency after giving one blood transfusion was treated by giving intravenous iron sucrose.

Most of the patients they required 1-2 units of PRBC transfusions (74%) [Table 8]. >4 units of transfusion were required occasionally (16.3%). Vachhaniet al. in their study discouraged practice of single-unit transfusion citing it as avoidable in majority of the cases, and the risks involved in blood transfusion can cause more damage than benefit to the patient<sup>[19,20]</sup>. Massive transfusions of  $\geq 5$  units of PRBC were done rarely (1.5%) [Table 9]. The indication for massive transfusion was caesarean hysterectomy (42.8%), antepartum haemorrhage (28.5%), post partum haemorrhage (14.2%) and ectopic pregnancy (14.5%). In a study by Green L et al, the main cause for massive transfusion at the time of delivery was uterine atony (40%) and the main mode of birth was caesarean section (59%). 45% women underwent hysterectomy and among all causes of PPH, placenta accrete had the highest hysterectomy rate<sup>[21]</sup>. In a study carried out in Netherland to investigate the outcome of woman receiving massive transfusion due to postpartum haemorrhage they found that uterine atony remained the leading cause of haemorrhage and 30% patients underwent peri-partum hysterectomy<sup>[22]</sup>. In a study carried out in new York in patients requiring massive blood transfusion during hospitalization for delivery it was found that the most common aetiologies of massive blood transfusion were abnormal placentation (26.6%), uterine atony (21.2%), placental

abruption (16.7%) and PIH associated with coagulopathy(15%) and a disproportionate number of women who received massive blood transfusion experienced severe morbidity including renal failure, acute respiratory distress syndrome, sepsis and in-hospital death<sup>[23]</sup>.

During pregnancy the changes in the coagulation and the fibrinolytic system in form of enhancement and inhibition respectively occur, <sup>[24]</sup> large volume blood loss causes consumptive loss of coagulation factors, which causes more bleeding and starts a vicious cycle ending up with DIC. These obstetric haemorrhage's could be massive and may require replacement of one entire blood volume within 24 h or replacement of 50% of total blood volume (TBV) within 3 h, i.e., massive blood transfusion (MBT). The setting of massive transfusion protocols (MTPs) describes the process of management of blood transfusion requirements in major bleeding episodes, assisting the interactions of the treating clinicians and the blood bank and ensuring judicious use of blood and blood components <sup>[25,26]</sup>. Increased capacity to tolerate bleeding due to physiological changes and often inaccurate estimation blood loss in obstetrics may not show change in their vital signs, resulting in a delay in the detection and treatment <sup>[24]</sup>.

Around 57 units of PRBC were returned or discarded during the study period. This is because of over demand sent to blood bank in anticipation of requirement leading to expiry or non-usage. The faculty, residents and house surgeons are trained in accordance with guideline recommendations about sending request forms for issuing blood and its components periodically (when to send, what to fill etc.) to improve the practice and minimize wastage.

Transfusion is a lifesaving procedure, but approximately 0.8-1% [Table 10] of all transfusions cause an immediate and delayed adverse reaction, despite the measures taken to reduce risks. Transmitted infections, haemolytic reactions, transfusion-associated acute lung injury (TRALI), hypocalcemia, hypomagnesemia, hyperkalemia, problems of massive transfusion such as hypothermia, metabolic acidosis and abnormalities of coagulation should deter all of us from indiscriminate use of blood components <sup>[27,28]</sup>.

## CONCLUSION

Blood transfusion is an essential component of obstetric care and at times lifesaving. The decision to perform a blood transfusion should be made on both clinical and haematological grounds. To avoid dilutional coagulopathy, concurrent replacement with coagulation factors and platelets may be necessary. Whole blood may be preferred in acute massive haemorrhage, especially where blood components are not readily available. From our study and review of literature we can safely conclude that anaemia in pregnancy is an important & commonest cause of blood transfusion in Indian subcontinent. Anaemia is a preventable indication and need for blood transfusion can be reduced if anaemia in pregnancy is rectified timely. Rational usage of blood and its components not only prevents transfusion related adverse events but also reduces their wastage.

## References:

1. Balki M, Dhumne S, Kasodekar S, et al.. Blood transfusion for primary postpartum hemorrhage: a tertiary care hospital review. *J Obstet Gynaecol Can.* 2008;30:1002–7.
2. Eyelade OR, Adesina OA, Adewole IF, et al. Blood transfusion requirement during caesarean delivery: risk factors. *Ann Ib Postgrad Med.* 2015;13:29–35.



3. Bates I, Chapotera GK, McKew S, et al. Maternal mortality in sub-Saharan Africa: the contribution of ineffective blood transfusion services. *BJOG*. 2008;115:1331–9.
4. Derek N. Transfusion Ten commandments. In: *Handbook of transfusion medicine*. 5th ed. Norwich: TSO Publishers; 2013.p. 1–3.
5. James AH, Paglia MJ, Gernsheimer T. Blood component therapy in postpartum hemorrhage. *Transfusion*. 2009;49:2430–
6. Matsunaga S, Seki H, Ono, Y et al. A retrospective analysis of transfusion management for obstetric hemorrhage in a Japanese Obstetric Center. *ISRN Obstet Gynecol*. 2012; 2012: 854064. Published online 2012 Feb 6.
7. Dickason LA, Dinsmoor MJ. Red blood cell transfusion and cesarean section. *American Journal of Obstetrics and Gynecology*. 1992;167(2):327–332. Available from: [https://dx.doi.org/10.1016/s0002-9378\(11\)91409-4](https://dx.doi.org/10.1016/s0002-9378(11)91409-4). doi:10.1016/s0002-9378(11)91409-4.
8. Alexander JM, Sarode R, McIntire DD, Burner JD, Leveno KJ. Whole blood in the management of hypovolemia due to obstetric hemorrhage. *Obstet Gynecol* 2009;113:1320-6.
9. Schantz-Dunn J, M N. The use of blood in obstetrics and gynecology in the developing world. *Rev Obstet Gynecol* 2011;4:86-91.
10. Chhabra S, Namgyal A. Rationale use of blood and its components in obstetric-gynecological practice. *J Mahatma Gandhi Inst Med Sci*. 2014;19:93–9.
11. Patel VP, Patel RV, Shah PT, et al. Study of role of blood transfusion in obstetric emergencies. *Int J Reprod Contracept Obstet Gynecol*. 2014;3(4):1002–5.
12. Agrawal VP, Akhtar M, Mahore SD. A retrospective clinical audit of blood transfusion requests in tertiary care hospital. *International Journal of Biomedical and Advance Research*.2013;4(9):658–658. Available from: <https://dx.doi.org/10.7439/ijbar.v4i9.488>. doi:10.7439/ijbar.v4i9.488.
13. 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: An International Journal of Obstetrics & Gynaecology*. 2019;126(13):1577–1586. Available from:<https://dx.doi.org/10.1111/1471-0528.15927>. doi:10.1111/1471-0528.15927
14. Prevention of Postpartum Hemorrhage Initiative. 2011. <http://www.pphprevention.org/pph.php>.
15. Millar C, Laffan M. Hemostatic changes in normal pregnancy. In:Cohen H, O'Brien P, editors. *Disorders of thrombosis and hemostasis in pregnancy: a guide to management*. London:Springer; 2015. p. 1–13.
16. Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY, et al. Obstetrical haemorrhage. In: Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY, et al., editors. *Williams Obstetrics*. 23rd ed. New York: McGraw-Hill;2010. p. 757-95.
17. Bangal VB, Gavhane SP, Aher KH, Bhavsar DK, Verma PR, Gagare SD. Pattern of utilization of blood and blood components in obstetrics at tertiary care hospital. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2017;6(10):4671–4671. Available from: <https://dx.doi.org/10.18203/2320-1770.ijrcog20174462>. doi:10.18203/2320-1770.ijrcog20174462

18. Anjali K, Varsha K, Sulabha J, Anuja B, Bhavana K, Savita S. Blood transfusion in Obstetrics and Gynaecology: A retrospective analysis. *Panacea Journal of Medical Sciences*. 2015;5(3):109–112.
19. Vachhani JH, Joshi JR, Bhanvadia VM. Rational use of blood: a study report on single unit transfusion. *Indian J Hematol Blood Transfus*. 2008;24(2):69–71.
20. Carson JL, Carless PA, Hebert PC. Transfusion thresholds and other strategies for guiding allogeneic red blood cell transfusion. *Cochrane Database Syst Rev*. 2010;10:CD002042.
21. Green L, Knight M, Seeney FM, Hopkinson C, Collins PW, Collis RE, et al. The epidemiology and outcomes of women with postpartum haemorrhage requiring massive transfusion with eight or more units of red cells: a national cross-sectional study. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2016;123(13):2164–2170. Available from: <https://dx.doi.org/10.1111/1471-0528.13831>. doi:10.1111/1471-0528.13831
22. Ramler PI, van den Akker T, Henriquez DDCA, Zwart JJ, van Roosmalen J, van Lith JMM, et al. Women Receiving Massive Transfusion Due to Postpartum Hemorrhage: A Comparison Over Time Between 2 Nationwide Cohort Studies. *Obstetric Anesthesia Digest*. 2020;40(2):67-68  
<https://dx.doi.org/10.1097/01.aoa.0000661340.97850.4e>. doi:10.1097/01.aoa.0000661340.97850.4e.
23. Mhyre JM, Shilkrut A, Kuklina EV, Callaghan WM, Creanga AA, Kaminsky S, et al. Massive blood transfusion during hospitalization for delivery in new york state. *Obstet Gynaecol*. 1998;122(6):1288–1294.
24. Millar C, Laffan M. Hemostatic changes in normal pregnancy. In: Cohen H, O'Brien P, editors. *Disorders of thrombosis and hemostasis in pregnancy: a guide to management*. London: Springer; 2015. p. 1–13.
25. Patil V, Shetmahajan M. Massive transfusion and massive transfusion protocol. *Indian J Anaesth*. 2014;58:590–5.
26. Borgman MA, Spinella PC, Perkins JG. The ratio of blood products transfused affects mortality in patients receiving massive transfusions at a combat support hospital. *J Trauma*. 2007;63:805–13.
27. Chhabra S, Namgyal A. Rationale use of blood and its components in obstetric gynecological practice. *Journal of Mahatma Gandhi Institute of Medical Sciences*. 2014;19(2):93–93. Available from: <https://dx.doi.org/10.4103/0971-9903.138427>. doi:10.4103/0971-9903.138427.
28. Ismail S, Siddiqui S, Shafiq F, et al. Blood transfusion in patients having caesarean section: a prospective multicentre observational study of practice in three Pakistan hospitals. *Int J Obstet Anesth*. 2014;23(3):253–9.