



The Transfusion Perspective of Whole blood Vs Blood Component use among obstetrics patient admitted in a Tertiary Care Hospital: A Cross-Sectional Study

¹Dr. Vinod Kumar C, ²Dr. Divya Ramalingam

¹Associate Professor, Department of Orthopaedics, Smt. B.K.Shah Medical Institute and Research Centre, Sumandeep Vidyapeeth (Institution deemed to be University), Vadodara, Gujarat, India

²Additional Divisional Medical Officer (ADMO), Department of Obstetrics & Gynaecology, Divisional Railway Hospital, Pratapnagar, Vadodara, Gujarat, India

Corresponding Author: Dr. Divya Ramalingam
Email: pimsdivya@gmail.com

Abstract

Background: Providing the most needed patient with the proper blood products in the right quantity at the right time allows us to close the gap between blood supply and demand. Effectiveness, safety, and sufficiency can be achieved by avoiding nonessential transfusion. A patient who receives whole blood transfusion may not necessarily need all of its components, but many recipients who need a particular component would benefit from its use by component preparations because, as we all know, blood is constantly in limited supply. The infections and transfusion-related risks of whole blood transfusion can be minimized when a patient just receives the necessary component. Finding the best transfusion perspective for whole blood versus blood component use is our study's main goal.

Method: Cross-sectional study is the type of study.

The investigation took place over a period of 18 months, from December 2017 to May 2019, at the Obstetrics and Gynaecology Unit of the Southern Railway Headquarters Hospital in Ayanavaram, Chennai. All the women who are admitted for obstetrics services are included in the research region.

Results: Few patients in the study have undergone more than one type of blood component transfusion, according to their criteria. There were transfusions of 63.15% packed RBCs, 47.36% whole blood, 14.03% random donor platelets, and 10.52% FFP plasma.

Conclusion: Post-partum hemorrhage (PPH) and Anemia during pregnancy were discovered to be the frequent indications for whole blood and packed red blood cell (PRBC) transfusion. Gestational thrombocytopenia and medical conditions complicating pregnancy were the two most frequent causes for platelet concentrate transfusion. Conditions like obstetric hysterectomy, ruptured tubal ectopic, APH, hypertensive disease of pregnancy, and disseminated intravascular coagulopathy

(DIC) were evenly distributed indications among the study subjects who received transfusions of fresh frozen plasma (FFP).

Keywords: Blood transfusion, whole blood, platelet concentrate, fresh frozen plasma, rational use.

Introduction

Blood transfusions save many lives every day by treating a variety of disorders of pregnancy, delivery, and post-partum. Rational use of blood is defined as the transfusion of safe blood products to treat a condition associated with high mortality and morbidity that cannot be controlled or averted by other means. Thus, appropriate use, balances the demand supply ratio and prevents the risks associated with unnecessary transfusion.

Component Vs. whole blood therapy: Blood started to be divided into its constituent parts in the 1970s. In areas with limited resources particularly in developing nations, the availability of fresh, warm blood can serve as an alternative to costly, infrastructure-reliant blood component therapy¹. Additionally, it protects the patient by exposing them to fewer donors. However, components therapy has more advantages over whole blood, which is less frequently used in the modern era of childbirth due to its drawbacks, including its short storage life (24 hours), large volume (500 ml per unit), hypercalcemia, platelet dysfunction, and some clotting factors degradation occurring within 1-2 days of storage². When whole blood is given to a patient, not all of the components may be necessary, but when it is utilized for specified component, many recipients would be benefited, as we know blood is always of short of supply.

Blood component therapy

Whole blood: It provides the material of source for six important component preparations like platelets, FFP, cryoprecipitate, albumin, immunoglobulin and clotting factors in modern blood transfusion therapeutics, with each of it having specific function. It contains red cells, clotting factors, and platelets. It is the component of choice for patients with acute hemorrhage with loss of >25% of blood which helps in improving capacity of oxygen carriage and expansion of blood volume³.

Packed RBCs: In hemorrhage, these are the first line therapy requiring replacement of RBCs. Each Packed RBCs unit contains around 300 ml of volume: 250ml RBCs and 50 ml plasma. On an average, each unit of Packed RBCs will increase 1 g/dl of hemoglobin and 3% of hematocrit².

Platelet: Plasma is where platelets are kept after being separated from blood. When the platelet count is below 20,000/mm³ after a vaginal delivery or below 50,000/mm³ after a caesarean section, or if there is evidence of coagulopathy, transfusion of platelets is indicated.

Fresh frozen plasma (FFP): FFP is the plasma that has been separated from whole blood. Antithrombin, fibrinogen, and factors V, XI and XII are all primarily present in FFP. Since each unit has a volume of about 250 ml, it also aids in volume resuscitation. At -18 to -30°C, it is frozen. When PT and/or aPTT rise 1.5 times above average, it is indicative. Fibrinogen levels are evaluated in order to track response to

FFP. Each unit of FFP raises the fibrinogen level by 5 to 10 mg/dl during the transfusion.

Cryoprecipitate: It is prepared by thawing of a unit of FFP. It contains Von Willebrand factor, fibrinogen, factor XIII and factor VIII in a 15-20 mL of bag. It is indicated in patients with very low fibrinogen level along with FFP transfusion during massive transfusion².

Methods: From December 1, 2017, to May 31, 2018, an 18-month study was conducted in the Obstetrics & Gynaecology Department of Southern Railway Headquarters Hospital, a tertiary care facility in Ayanavaram, Chennai. All of the women admitted as obstetric inpatients throughout this time period made up the study population. The patient who needs an urgent whole blood transfusion was informed of the need for it and its associated potential risks. According to our hospital's practice and guidelines, informed consent was obtained from every patient prior to transfusion. Additionally, a patient information leaflet was also given to them. The patient's case sheet was filled with clinical information and the reasons for ordering blood or blood products were noted, and the blood requisition orders were processed and cross-matched as per hospital guidelines.

Sample size: The study conducted by Bangal VB et al⁴. was used to determine the sample size. The 1% absolute precision and 95% confidence level were the additional factors taken into account.

$$n = \frac{Z^2 P(1 - P)}{d^2}$$

n = Sample Size⁵.

P = Expected prevalence of proportion (If the expected prevalence is 5.3%, then P= 0.053).

d = Precision (If the precision is 1%, then d=0.01).

Z = Z statistic for a degree of confidence= 1.96.

The estimate revealed that there should be 1929 women in the sample. Another 96 women were included, assuming a 5% non-participation rate. As a result, we intended to include at least 2115 women in the final analysis. In the final analysis, 2381 women who had obstetric treatment were examined. The completed study had 57 participants who received the transfusion in total.

Statistical methods

The percentage of whole blood and blood component transfusion constitutes primary outcome variable and the indications of its transfusion constitutes primary explanatory variables. Mean and standard deviation was used for descriptive analysis for quantitative variables and for categorical variables, frequency and proportion was used. Since the study is only descriptive, no inferential statistical analysis has been done. Hence no P values have been reported. Statistical software used for data analysis was IBM SPSS⁶.

Results

Based on their need, only a small number of study participants received transfusions of more than one type of blood component. Transfusions of packed RBCs (63.15%), whole blood (47.36%), random donor platelets (14.03%) and FFP (10.52%) were all carried out among the study population. (Table 1). Figures 1, 2, and 3 demonstrate, respectively, the numerous indications for which PRBC, whole blood, and platelets were transfused. The indications for FFP transfusions were equally distributed at the rate of twenty percent for ruptured tubal ectopic, APH, hypertensive condition of pregnancy, DIC, or obstetric hysterectomy.

Table 1: Descriptive analysis of type of transfusion in the study population (N=57)

Type of transfusion	Frequency	Percentages
PRBC	36	63.15%
whole blood	27	47.36%
Random donor platelets	8	14.03%
Fresh frozen plasma	6	10.52%

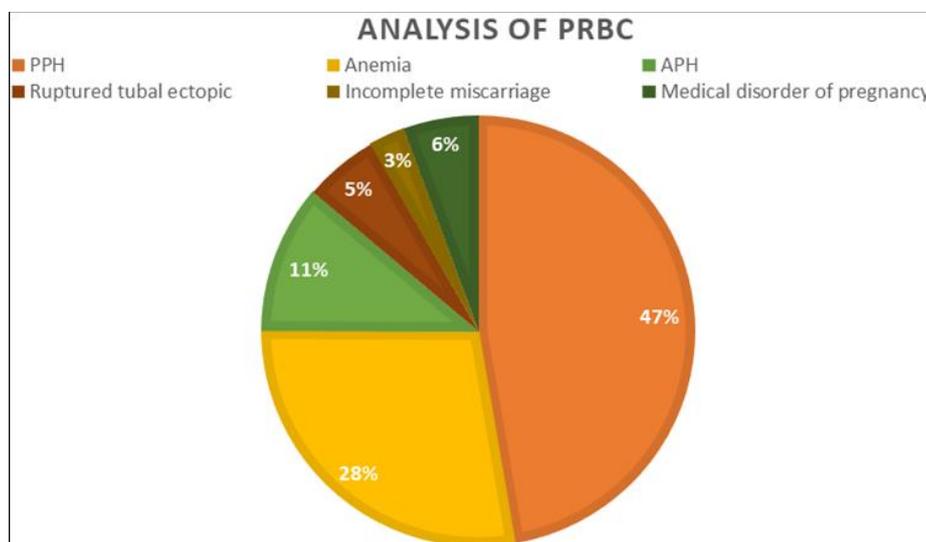


Fig 1: Pie chart of analysis of PRBC transfusion in the study population (N=57)

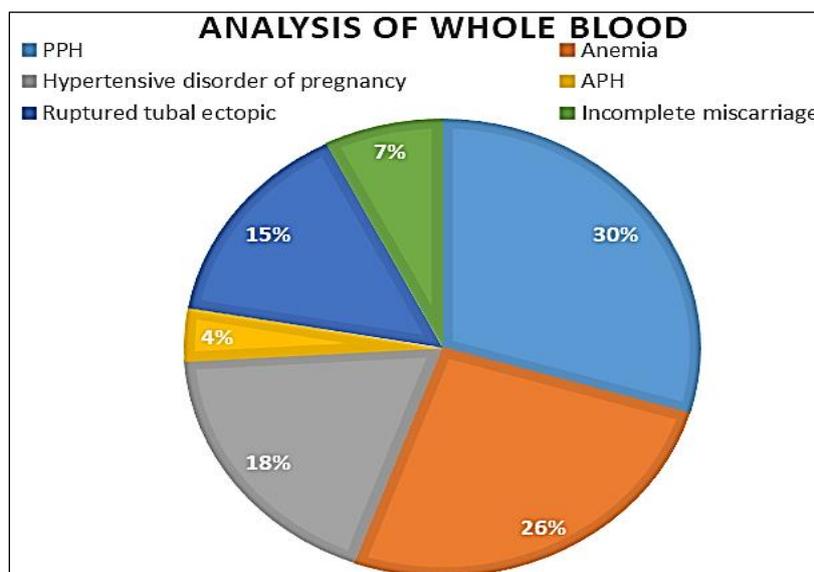


Fig 2: Pie chart of analysis of whole blood transfusion in the study population (N=57)

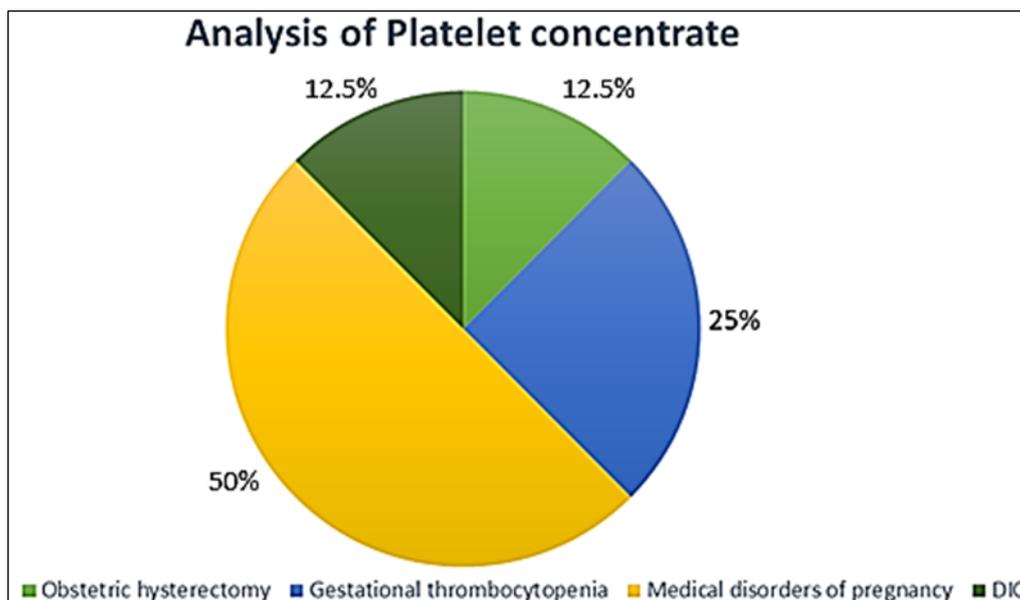


Fig 3: Pie chart of analysis of platelet concentrate transfusion in the study population (N=57)

Discussion

Similar to studies by Chawla et al ⁷ and Anjali et al ⁸, the majority of patients in present study had packed red blood cell transfusion, followed by whole blood and other blood component therapies. (Table 2)

The study by Bangal et al ⁴ found almost similar results, but FFP was used more frequently since the majority of the study group had suffered a substantial obstetric haemorrhage for a variety of reasons, including PPH, APH and obstetric hysterectomy.

Table 2: Discussion on type of blood products transfused among various studies

Type of blood product transfused	Current study	Chawla et al. ⁷	Anjali et al. ⁸	Bangal et al. ⁴
PRBC	63.16%	49.3%	32.3%	45.8%
Whole blood	47.37%	-	18.2%	0.33%
Platelet concentrate	14.04%	41.2%	15.1%	4.02%
Fresh frozen plasma	10.53%	9.3%	8.2%	46.62%
Cryoprecipitate	-	-	-	0.17%

Conclusion

The two most frequent reasons for transfusion of PRBC and whole blood were post-partum hemorrhage (PPH) and anemia in pregnancy. Gestational thrombocytopenia and medical conditions complicating pregnancy were the two most frequent reasons for transfusion of platelet concentrate. Among the subjects who received transfusion of FFP, the indications were equally distributed between ruptured tubal ectopic, APH, hypertensive disorder of pregnancy, DIC and obstetric hysterectomy.

References

1. Schantz-Dunn J, M N. The use of blood in obstetrics and gynecology in the developing world. *Rev ObstetGynecol.* 2011;4:86-91.

2. Karrie E, Francois and Michael R. Foley. Anetpartum and postpartum hemorrhage. *Obstetrics normal and problem pregnancies*. Steven G. Gabbe 6th ed. Elsevier;2012.
3. Nigam A, Prakash A, Saxena P. Blood Transfusion in Obstetrics. *Kathmandu Univ Med J*. 2013;11(44):355-9.
4. 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. *Int J ReprodContraceptObstet Gynecol*. 2017 Sep;6(10):46-71.
5. IBM SPSS Statistics for Windows, Version 22.0. IBM Corp Armonk, NY; c2013.
6. IBM Corp. Released. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp, 2013.
7. Chawla S, Bal MHK, Vardhan BS, Jose CT, Sahoo I. Blood Transfusion Practices in Obstetrics: Our Experience. *J ObstetGynecol India*. 2018 Jun;68(3):204-7.
8. Anjali K, Varsha K, Sulabha J, Anuja B, Bhavana K, Savita S. Blood transfusion in Obstetrics and Gynaecology: A retrospective analysis. 4.