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The Transfusion Perspective of Whole Blood Vs Blood Component Use Among Obstetrics Patient Admitted in A Tertiary Care Hospital – A Cross-Sectional Study

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Vinod Kumar C[1], Divya Ramalingam[2*]

[1]Associate Professor, Department of Orthopaedics, Smt. B.K.Shah Medical Institute and Research centre, Sumandeep Vidyapeeth (Institution deemed to be University), Vadodara, Gujarat, India - 391760

[2]Additional Divisional Medical Officer (ADMO), Department of Obstetrics & Gynaecology, Divisional Railway Hospital, Pratapnagar, Vadodara, Western Railway.

Keywords:

Blood transfusion, Whole blood, platelet concentrate, Fresh Frozen Plasma, Rational use

Abstract

Background: Rational use of blood means to provide appropriate blood products to the most needed patient in the correct quantity at right time by that we can bridge demand and supply gap. By preventing unnecessary Transfusion we can achieve effectiveness, safety and adequacy. A patient who receives a whole blood may not necessarily require all the components, but when it is used for component preparations, many recipients who actually need specific component would be benefited, as we know blood is always of short of supply. When a patient receives only the needed component, the actual transfusion associated risk and infections of whole blood could also be avoided. The objective of our study is to find the best transfusion perspective regarding whole blood Vs blood product component use and its indications among women admitted for obstetric care.

Methods:

Type of Study: Cross sectional study

The study was conducted in the Obstetrics and Gynaecology Department, Southern Railway Headquarters Hospital, Ayanavaram, Chennai, over 18 months between December 2017 and May 2019. The study area includes all the women admitted for obstetrics services.

Results: In the study, based on their indications, few patients have received more than one type of blood component transfusion. 63.15% of Packed RBC's transfusion, 47.36% transfusion of whole blood, 14.03% of random donor platelets and 10.52% of FFP plasma were done.

Conclusions: Post-partum haemorrhage (PPH) followed by anaemia in pregnancy were found to be common indications for packed red blood cell (PRBC) transfusion and whole blood transfusion. Medical disorders complicating pregnancy and gestational thrombocytopenia were the two most common indications for transfusion of platelet concentrate. Among the study participants who were transfused with Fresh frozen plasma (FFP), the indications were equally distributed for ruptured tubal ectopic, APH, hypertensive disorder of pregnancy, Disseminated Intravascular Coagulopathy (DIC) and obstetric hysterectomy.

1. Introduction:

Every day blood transfusion saves many lives, in various disorders of pregnancy , birth and post-birth. Safe blood products transfusion to treat a condition affected by significant mortality and morbidity which cannot be managed or prevented by other methods is called as rational use of blood. It prevents the hazards of blood transfusion and reduces the demand and supply ratio.

Whole blood Vs component therapy **:** In 1970's blood began to be separated into its components parts. Fresh warm blood availability in resource poor settings and developing countries can be an alternative to infrastructure dependent and expensive blood component therapy [(1)]. It has the additional advantage of exposing the patient to fewer donors. However, components therapy have more advantage over whole blood which is not commonly used in present obstetric era owing to its disadvantages, like less storage life (24 hours), volume which is large (500 ml per unit), hypercalcemia, dysfunction pf platelets and some clotting factors degradation occur within 1-2 days of storage [(2)]. A patient who receives a whole blood may not necessarily require all the components, but when it is used for component preparations, many recipients who actually need specific component would be

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benefited, as we know blood is always of short of supply. When a patient receives only the needed component, the actual transfusion associated risk and infections associated with transfusion of whole blood could also be avoided. Each blood component has optimal storage condition, which when followed increases the shelf life, safety and efficacy of the components also.

Blood component therapy:

Packed RBC's : In haemorrhage , these are the first line therapy requiring replacement of RBC's. Each Packed RBC's unit contains around 300 ml of volume: 250ml RBC's and 50 ml plasma. On an average, each unit of Packed RBC's will increase 1 g/dl of hemoglobin and 3% of hematocrit [(2)]

Whole blood: It provides the material of source for 6 important component preparation 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 haemorrhage with loss of >25% of blood which helps in improving capacity of oxygen carriage and expansion of blood volume. [(3)].

Platelets: It is stored in plasma after separating it from blood. Transfusion of Platelets transfusion is indicated when platelet count <20,000/mm3 following vaginal delivery or <50,000mm3 following caesarean section, or if there is evidence of coagulopathy.

FFP : Fresh frozen plasma is plasma which is obtained by separating it from whole blood. It contains anti-thrombin, fibrinogen and factors V, XI, XII. It also helps in volume resuscitation since each unit has a volume of around 250ml. It is frozen at -18° to -30°C. It is indicated when PT and/or aPTT is increased 1.5 times more than the normal.Response to FFP is monitored by measuring fibrinogen levels. Fibrinogen level of 5 to 10mg/dl is raised with transfusion by each unit of FFP

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 transfusion. [(2)]

2. Methods

This study was carried out in the Obstetrics and Gynecology department, Southern Railway Headquarters Hospital, a tertiary care hospital at Ayanavaram, Chennai, for 18 months from December 01, 2017 to May 31, 201. The study population include, all the women admitted for obstetric inpatient during this period. The patient who required an emergency whole blood transfusion was explained about its necessity and the possible risk associated with it. From all the patients informed consent was taken before transfusion, as per our hospital protocol and guideline. They were also provided with a patient information sheet. Clinical details and the indications for ordering a blood or blood product were noted in the patient's case sheet and the blood requisition orders were processed and cross-matching done as per the transfusion guidelines of our hospital. Our hospital is equipped with good blood bank facility, with 24hours a day functioning facility, under the Department of Pathology.

Sample size: The sample size was calculated according to the study done by Bangal VB et al[(4)]. The other parameters considered were 1% absolute precision and 95% confidence level.

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

Where n = Sample size

Z = Z statistic for a level of confidence= 1.96

P = Expected prevalence of proportion

(If the expected prevalence is 5.3%, then P= 0.053), and

d = Precision (If the precision is 1%, then d=0.01) [(5)]

According to the calculation, the required sample size was 1929 women. Assuming 5% of non-participation rate, another 96 women were added. Hence we planned to include not less than 2115 women in the final study. A total of 2381 women who underwent obstetric care were studied in the final analysis. The final study included a total of 57 subjects.

Statistical methods:

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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 SPSS[6].

3. Results:

Among the study participants, few patients have received more than one type of blood component transfusion depending on their indication. 63.15% of Packed RBC's transfusion, 47.36% of whole blood transfusion, 14.03% of random donor platelets and 10.52% of FFP were done. (Table 1)

The various indications for which PRBC, whole blood and platelet were transfused, are shown in (Figure 1, 2, 3) respectively

Among those who were transfused with FFP, the indications were equally distributed at 20% for ruptured tubal ectopic, APH, hypertensive disorder of pregnancy, DIC and obstetric hysterectomy.

4. Discussion:

In my study, majority has received packed red blood cell transfusion followed by whole blood and other blood component therapy, which are in comparison to other studies like Chawla[7] and Anjali et al[8]. (Table 2)

Results were similar in the study by Bangal et al[4], except that FFP were used at a relatively higher rate due to their majority of study population had massive obstetric haemorrhage due to various reasons like PPH, accidental haemorrhage, APH and obstetric hysterectomy.

5. Conclusion:

Post-partum haemorrhage followed by anaemia in pregnancy were the two most common indications for transfusion of PRBC and whole blood. Medical disorders complicating pregnancy and gestational thrombocytopenia were the two most common indication for transfusion of platelet concentrate. Among the study participants who were transfused with FFP, the indications were equally distributed between ruptured tubal ectopic, APH, hypertensive disorder of pregnancy, DIC and obstetric hysterectomy.

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TABLES

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%

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

Type of blood product transfused	Current study	Chawla et al[9]	Anjali et al[28]	Bangal et al[11]
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%

Figures

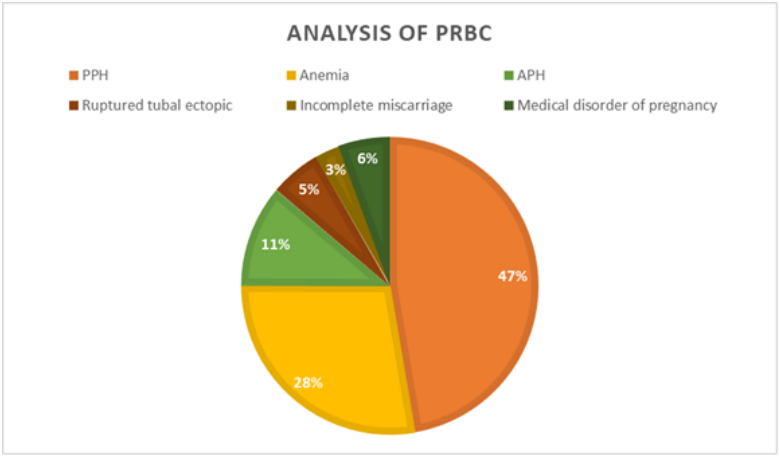

Figure 1: Pie chart of analysis of PRBC transfusion in the study population (N=57)

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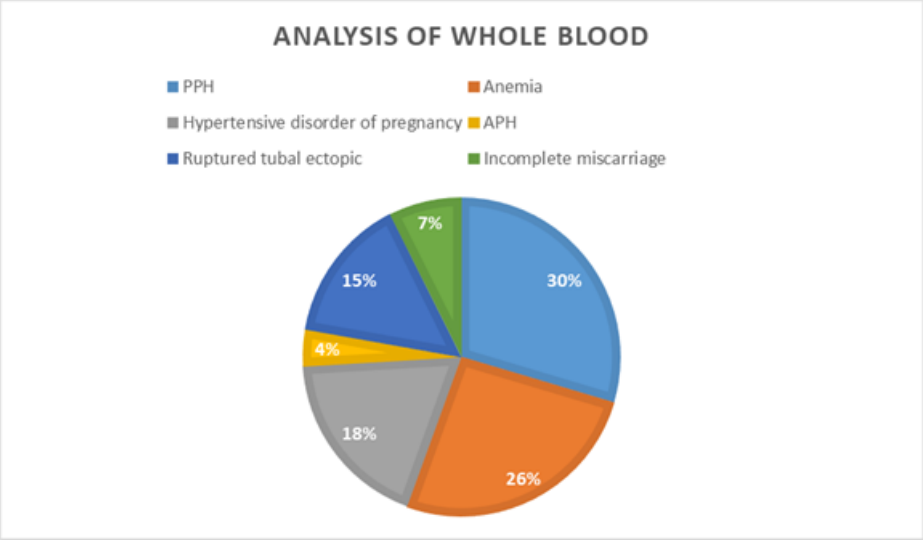

Figure 2: Pie chart of analysis of whole blood transfusion in the study population (N=57)

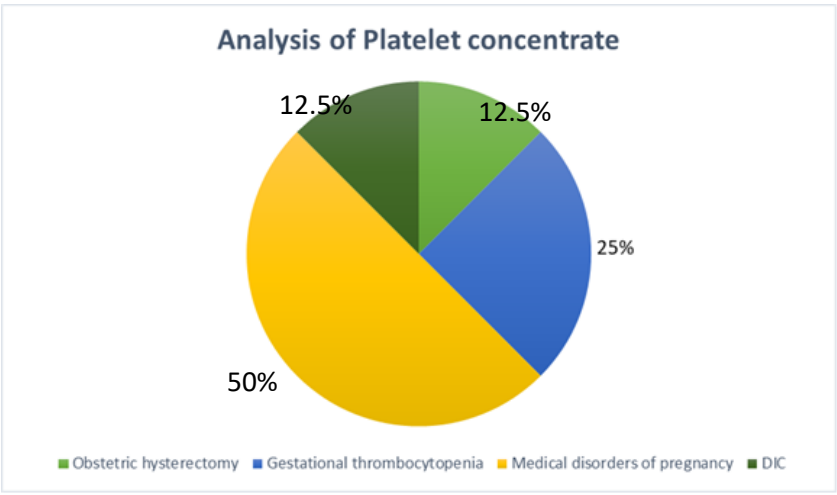

Figure 3: Pie chart of analysis of platelet concentrate transfusion in the study population (N=57)