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Original Research Article

Indication of blood components transfusion in obstetrics

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ABSTRACT

Background: Blood and blood component utilization is an integral part of patient management in obstetrics and is often a life saving measure. Various pregnancy complications including 1st trimester complications and disorders of labor show up as conditions needing transfusion in the day-to-day practice of obstetrics.
Methods: This prospective study was carried out at the department of obstetrics of tertiary care teaching hospital from April 2021 over a period of 18 months and data was collected from all patients (140) who had received transfusion of blood products for any obstetric cause.
Results: Out of a total 3102 obstetric admissions, 140 (4.51%) participants received blood product transfusion. Anemia (42.1%) followed by postpartum hemorrhage (20%) followed by antepartum hemorrhage (16.4%) and 1st trimester complications (16.4%) were the major cause for blood product transfusion. 33.6% of participants gave no history of antenatal care (ANC) visits while 25.7% had only 1 to 3 ANC visits. 44.3% gave no history of hematinic intake while 31.4% had irregular hematinic intake. The department utilized maximum number of packed red blood cells (PRBC) followed by fresh frozen plasma (FFPs) and platelet concentrates.
Conclusions: Three most common indications for transfusion were nutritional anemia, obstetric hemorrhage and first trimester complications. Majority of patients had inadequate or no antenatal care. Early and regular antenatal care, early diagnosis and management of high-risk pregnancies and obstetric complications, institutional delivery can reduce the rate of transfusion of blood products.

Keywords: Blood transfusion, Anemia, Obstetric hemorrhage

INTRODUCTION

Pregnancy and child birth is an important process to sustain and propagate life. However certain complications can turn this phase of creation into a phase of destruction. None of the complications is dangerous as hemorrhage and anemia. Blood and blood component utilization is an integral part of patient management in obstetrics and is often a life saving measure. In developing countries obstetric complications are the leading indication for blood transfusion. Hemorrhage remains one of the leading causes of maternal mortality in both developed as well as developing countries. Worldwide, pregnancy related hemorrhage is the most common cause of maternal death, causing 27% of the 295,000 maternal deaths annually.[1] Postpartum phase is responsible for 80% of the cases of maternal hemorrhage and is responsible for 18% of the estimated 295,000 maternal deaths each year.[2]

In developing countries like India there is a high prevalence of under nutrition and nutritional anemia. These nutritional deficiency disorders get further aggravated during pregnancy due to physiological changes of pregnancy. This hampers the tolerance for even minimal blood loss and may result in hemorrhagic shock. The prevalence of anemia have been quoted to be 14% in developed countries and to the tune of 51% in developing countries. In India, it varies from 65% to 75%.[3]

To compensate the loss, immediate and rapid replacement of sufficient and safe blood and blood components become essential to save the lives of women, especially in already anemic patients.

In the terminal stage of pregnancy, where the coagulation system is enhanced and the fibrinolytic system are suppressed, massive hemorrhage leads to consumption of coagulation factors, leading to further hemorrhage, forming the vicious circle disseminated intravascular coagulation (DIC). Systemic disorders like DIC and hemolysis, elevated liver enzymes, low platelet count (HELLP) syndrome are catastrophic conditions that make rapid availability of safe blood components a necessity.

A common assumption among physicians is that one unit of packed red blood cells (PRBC) raises the hemoglobin (Hb) by approximately 1g/dl and the hematocrit (Hct) by about 3% in an adult. It has been implied that blood volume is expanded immediately after transfusion and does not return to normal for 24 hours. Equilibration of Hb concentration after transfusion has been estimated to take about 24 hours, but some studies have shown that earlier measurements reflect steady-state values in patients who have not bled recently. However, the time in which this blood concentration is reached after one PRBC transfusion is unclear. In clinical practice, a shorter time point to evaluate Hb or Hct can help in early intervention and reduce the time for hospitalization.[4]

The present study aimed to find out the incidence and indications of transfusion of blood and blood components in obstetrics at tertiary care hospital. The study also aim to determine the point at which equilibrium of Hb and Hct after red cell transfusion is reached.

METHODS

A prospective study was undertaken over the period of 18 months from April 2021 in the department of obstetrics and gynecology at GMCH, Chandigarh. This study was conducted on pregnant patients and immediate postpartum patients (up to 7 days after delivery) admitted in department of obstetrics and gynecology and requiring blood component transfusion.

Inclusion criteria

Patients diagnosed with clinical indication of blood component transfusion during pregnancy or during post-partum phase were included in the study. Actively bleeding patients were included in the study to find out the incidence of various indications for blood component transfusion but were not included in the sub analysis group (effects of PRBC transfusion on quality parameters of blood).

Exclusion criteria

Patients who refused participation in the study, refused blood component transfusion, and who developed blood reaction and hemolysis were excluded from the study.

Clinical criteria for transfusion

The decision of transfusion of blood components was made by the treating physician according to the individual's clinical status, Hb levels signs, symptoms, age and medical history.

Though for build-up in obstetric patients with chronic anemia following standard guidelines were followed including RCOG green top guidelines no. 47, 2015 22 and ACOG Practice Bulletin No. 233, 2021 25.

History of the patients including demographic and other details like age, parity, socioeconomic status, residence, booking status etc. and underlying indication commanding blood component transfusion were taken. Incidence ratio of blood component transfusion was calculated. Significance of association of transfusion of blood and blood components with characteristics of women was tested by using Chi-square test of significance. P value of 0.05 was taken to be significant. Patients that completed the criteria for the sub analysis group i.e. received only 1 unit PRBC and were not actively bleeding were included in the sub analysis group. Baseline investigations including Hb, Hct, reticulocyte count and immature reticulocyte fraction were sent and noted. Repeat investigations were sent at 4 hours, 12 hours and 24 hours post transfusion of 1 unit PRBC. These investigations were further compared to look for significant trends of change in each parameter.

RESULTS

During the study period there were a total 3102 obstetric admissions, 140 patients out of these required transfusion of single or multiple blood components i.e. 4.513% of all obstetric admissions required blood component transfusion. The incidence ratio of blood component transfusion was determined to be 45.13/1000 obstetric admissions.

Demographic distribution

The age of the subjects varied from 18 to 42 years. The mean age was 28.16±5.14 years while the majority of subjects were aged between 21-25 years. 78.5% (n=110) of the participants were multipara while only 21.4%

(n=30) of the participants were nulliparous. Significantly more multiparous women required transfusion as compared to nulliparous women (p value <0.001). 55.7% (n=78) of the study subjects resided in rural area and 44.2% (n=62) resided in urban area. Participants residing in rural areas had a higher incidence of transfusion.

Based on modified Kuppuswamy scale, 79.2% (n=111) belonged to the lower socio-economic strata, 20% (n=20) belong to the middle socio-economic class and 0.7% (n=1) belonged to the upper socio-economic class. The difference in this socioeconomic status between lower and higher (middle and upper) was found to be of statistical significance (p value <0.001) (Table 1).

Table 1: Demographic parameters of participants.

Parameters	Number (n=140)	Percentage
Age (years)		
18-20	2	1.42
21-25	48	34.28
26-30	46	32.85
31-35	31	22.14
36-40	12	8.57
40-45	1	0.71
Parity		
Nullipara	30	21.4
Multipara	110	78.5
Residence		
Rural	78	55.7
Urban	62	44,2
Socio economic status		
Lower	111	79.3
Middle	28	20
Upper	1	0.7

Antenatal care

66.4% (n=93) of the subjects were booked at some hospital while 33.6% (n=47) of the subjects were not booked at any hospital. Among the booked subjects, 38.7% (n=36/93) were unsupervised / poorly supervised while 61.3% (n=57/93) were supervised which was statistically significant (p value=0.028). 33.6% (n=47/140) of the subjects gave no history of any antenatal visits, 25.7% (n=36/140) were poorly supervised and gave history of only 1 to 3 antenatal visits. 38.5% (n=57/140) of the subjects were adequately supervised and had 4 or more antenatal visits (1 in each trimester). 44.3% (n=62/140) gave no history of hematinic intake. 55.7% (n=78/140) gave history of hematinic intake, out of which 56.4% (n=44/78) had irregular intake of hematinic and 43.6% (n=34/78) had regular hematinic intake (p value=0.25) (Table 2).

15.7% (n=22) received transfusion in the 1st trimester, 2.9% (n=4) received transfusion in 2nd trimester and 81.4% (n=114) received transfusion in 3rd trimester. 23.6% (n=33/140) received blood component transfusion during antenatal period, 47.1% (n=66/140) during intrapartum period and 9.3% (n=14/140) during postpartum period. 5.0% (n=7/140) were transfused blood components during both antenatal and intrapartum periods while 14.3% (n=20/140) were transfused blood components during both intrapartum and postpartum periods. Out of the 114 third trimester participants that required blood component transfusion, 43.9% (n=50/114) underwent vaginal delivery, while 56.1% (n=64/114) underwent caesarean section (Table 3).

Table 2: ANC status of participants.

Parameters	Number (n=140)	Percentage
Cases		
Booked	93	66.4
Unbooked	47	33.6
Supervision status (n=93)		
Unsupervised (1-3 ANC)	36	38.7
Supervised (≥4 ANC)	57	61,3
Hematinic status (n=140)		
Not received	62	44.3
Received	78	55.7
Irregular	44	31.4
Regular	34	24.3

Table 3: Distribution of patients on basis of time and stage of pregnancy.

Parameters	Number (n=140)	Percentage
Trimester		
1st	22	15.7
2nd	4	2.9
3rd	114	81.4
Time of transfusion		
Antenatal	33	23.6
Antenatal + intrapartum	7	5.0
Intrapartum	66	47.1
Intrapartum + postpartum	20	14.3
Postpartum	14	9.3
Mode of delivery (n=114)		
Vaginal delivery	50	43.9
LSCS	64	56.1

Indication for transfusion

In our study chronic anemia either during pregnancy or immediate postpartum is found to be the most common indication for transfusion of blood components (42.1%). Postpartum hemorrhage was the 2nd most common indication of transfusion, among the 28 subjects (20%) that required transfusion due to postpartum hemorrhage, out of these 27 subjects suffered from atonic PPH while 1 subject suffered from traumatic PPH. Antepartum hemorrhage (placenta previa-10.7% and abruption placentae-5.7%)

and 1st trimester complications (ruptured ectopic-8.6% and abortion related complications-7.8%) were other major contributors leading to blood component transfusion, both responsible for 16.4% of the incidence of blood component transfusion each. Other indications of transfusions included thrombocytopenia (3.6%), HELLP syndrome (0.7%) and uterine rupture (0.7%) (Table 4).

Table 4: Indication of blood component transfusion.

Indication of transfusion	Number	Percentage
Anemia	59	42.1
1st trimester	23	16.4
Ectopic	12	8.6
Abortion	11	7.8
Antepartum hemorrhage	23	16.4
Placenta previa	15	10.71
Abruption placentae	8	5.7
Postpartum hemorrhage	28	20
Atonic	27	19.3
Traumatic	1	0.7
HELLP	1	0.7
Uterine rupture	1	0.7
Thrombocytopenia	5	3.6

Blood component utilization

A total of 423 blood components were utilized. 249 units of packed red blood cells were used contributing to 58.9% (n=249/423) of all blood components consumed. 92 units of fresh frozen plasma were used (21.7%) and 82 units of platelet concentrates were used (19.4%). 20% (n= 28/140) of the participants required the transfusion of more than 1 type of blood component, in which 12 participants required both PRBC and FFP transfusion, 6 requiring PRBC and PC transfusion and 10 requiring PRBC, FFP and PC transfusion. 80% (n=112/140) required transfusion of only 1 type of blood component. Among the 131 subjects requiring PRBC transfusion, 31.4% (n=44/131) required transfusion of only 1 unit of PRBC, 45.7% (n=64/131) required 2-unit PRBC transfusion, 10.7% (n=15/131) required 3-unit PRBC transfusion and 5.7% (n=8/131) required 4 or more units of PRBC transfusion (Table 5).

Sub analysis

Out of the 140 patients included in the study, 40 patients that completed the criteria for the sub analysis group i.e. received only 1 unit PRBC and were not actively bleeding were included in the sub analysis group.

Baseline investigations (explained above in materials and methods) were sent and noted. Repeat investigations were sent at 4 hours, 12 hours and 24 hours post transfusion of 1 unit PRBC. To check for level of significance the parameters were subdivided in pairs and paired t tests were run between each pair to look for significance of correlation. P value of 0.05 was considered to be significant and a confidence interval of 95% was taken.

Table 5: Distribution of blood components used.

Variables	Quantity	Percentage
Type of component		
PRBC	249	58.9
FFP	92	21.7
Platelet concentrate	82	19.4
Total	423	100
Distribution of component utilization (n=140)		
PRBC	103	73.6
Platelet concentrate	8	5.7
FFP	1	0.7
PRBC + FFP	12	8.6
PRBC + FFP + platelet concentrate	10	7.1
PRBC + platelet concentrate	6	4.3
Number of PRBC units transfused per case (n=131)		
1	44	31.4
2	64	45.7
3	15	10.7
4 or more	8	5.7

Hemoglobin

Hb levels were significantly (t=12.48, df=39, p value <0.001) more post 4 hours PRBC transfusion as compared to pre transfusion levels. Hb levels were significantly (t=19.464, df=39, p value <0.001) more post 12 hours PRBC transfusion as compared to pre transfusion levels. Hb levels were significantly (t=20.334, df=39, p value <0.001) more post 24 hours PRBC transfusion as compared to pre transfusion levels. Hb levels were significantly (t=4.163, df=39, p value <0.001) more post 12 hours PRBC transfusion as compared to post 4 hours PRBC transfusion. Hb levels were significantly (t=2.102, df=39, p value=0.042) more post 24 hours PRBC transfusion as compared to post 12 hours PRBC transfusion (Table 6).

Hematocrit

Hct levels were significantly (t=3.849, df=39, p value <0.001) more post 4 hours PRBC transfusion as compared to pre transfusion levels. Hct levels were significantly (t=13.515, df=39, p value <0.001) more post 12 hours PRBC transfusion as compared to pre transfusion levels. Hct levels were significantly (t=15.227, df=39, p value <0.001) more post 24 hours PRBC transfusion as compared to pre transfusion levels. Hct levels post 12 hours PRBC transfusion was less than post 24 hours transfusion but was not statistically significant (t=-0.249, df=39, p value=0.805). Hct levels were significantly (t=2.081, df=39, p value=0.044) more post 24 hours PRBC

transfusion as compared to 12 hours post transfusion levels (Table 7).

Reticulocyte count

The reticulocyte count % was significantly (t=6.96, df=39, p value <0.001) more post 4 hours PRBC transfusion as compared to pre transfusion levels. The reticulocyte count % was significantly (t=4.746, df=39, p value <0.001) more post 12 hours PRBC transfusion as compared to pre transfusion levels. The reticulocyte count % was significantly (t=3.056, df=39, p value=0.004) more post 24 hours PRBC transfusion as compared to pre transfusion levels. There was a significant (t=-6.621, df=39, p value <0.001) fall in reticulocyte count % between 24 hours post PRBC transfusion and 12 hours post PRBC transfusion (Table 8).

Immature reticulocyte fraction

The immature reticulocyte fraction % was significantly (t=6.85, df=39, p value <0.001) more post 4 hours PRBC transfusion as compared to pre transfusion levels The immature reticulocyte fraction % was significantly (t=6.79, df=39, p value <0.001) more post 12 hours PRBC transfusion as compared to pre transfusion levels. The immature reticulocyte fraction % was significantly (t=4.24, df=39, p value <0.001) more post 24 hours PRBC transfusion as compared to pre transfusion levels.

There was a significant (t=-7.83, df=39, p value <0.001) fall in immature reticulocyte fraction % between 24 hours post PRBC transfusion and 12 hours post PRBC transfusion (Table 9).

Table 6: Paired T test for hemoglobin-pre transfusion versus 4 hours post transfusion versus 12 hours post transfusion versus 24 hours post transfusion.

Variables		Paired T tests for hemoglobin levels							
		Mean	Std. deviation	Std. error mean	95% confidence interval of the difference		T	Df	Sig. (2 tailed)
					Lower	Upper			
Pair 1	4 hours post transfusion – pre transfusion	0.7925	0.4015	0.0635	0.6641	0.9209	12.483	39	<0.001
Pair 2	12 hours post transfusion – pre transfusion	1.0050	0.3266	0.0516	0.9006	1.1094	19.464	39	<0.001
Pair 3	24 hours post transfusion – pre transfusion	1.0475	0.3258	0.0515	0.9433	1.1517	20.334	39	<0.001
Pair 4	12 hours post transfusion – 4 hours post transfusion	0.2125	0.3228	0.0510	0.1093	0.3157	4.163	39	<0.001
Pair 5	24 hours post transfusion – 12 hours post transfusion	0.0425	0.1279	0.0202	0.0016	0.0834	2.102	39	0.042

Table 7: Paired T test for hematocrit % - pre transfusion versus 4 hours post transfusion versus 12 hours post transfusion versus 24 hours post transfusion.

Variables		Paired T tests for hematocrit %							
		Mean	Std. deviation	Std. error mean	95% confidence interval of the difference		T	Df	Sig. (2 tailed)
					Lower	Upper			
Pair 1	4 hours post transfusion – pre transfusion	3.3625	5.5245	0.8735	1.5957	5.1293	3.849	39	<0.001
Pair 2	12 hours post transfusion – pre transfusion	3.1625	1.4799	0.2340	2.6892	3.6358	13.515	39	<0.001
Pair 3	24 hours post transfusion – pre transfusion	3.4350	1.4268	0.2256	2.9787	3.8913	15.227	39	<0.001
Pair 4	12 hours post transfusion – 4 hours post transfusion	-0.2000	5.0803	0.8033	-1.8248	1.4248	-0.249	39	0.805
Pair 5	24 hours post transfusion – 12 hours post transfusion	0.2725	0.8283	0.1310	0.0076	0.5374	2.081	39	0.044

Table 8: Paired T test for reticulocyte count % - pre transfusion versus 4 hours post transfusion versus 12 hours post transfusion versus 24 hours post transfusion.

Variables		Paired T tests for reticulocyte count							
		Mean	Std. deviation	Std. error mean	95% confidence interval of the difference		T	Df	Sig. (2 tailed)
					Lower	Upper			
Pair 1	4 hours post transfusion – pre transfusion	0.31600	0.28677	0.04534	0.22429	0.40771	6.969	39	<0.001
Pair 2	12 hours post transfusion – pre transfusion	0.27750	0.36981	0.05847	0.15923	0.39577	4.746	39	<0.001
Pair 3	24 hours post transfusion – pre transfusion	0.17075	0.35337	0.05587	0.05774	0.28376	3.056	39	0.004
Pair 4	12 hours post transfusion – 4 hours post transfusion	-0.03850	0.19319	0.03055	-0.10028	0.02328	-1.260	39	0.215
Pair 5	24 hours post transfusion – 12 hours post transfusion	-0.10675	0.10196	0.01612	-0.13936	-0.07414	-6.621	39	<0.001

Table 9: Paired T test for immature reticulocyte fraction % - pre transfusion versus 4 hours post transfusion versus 12 hours post transfusion versus 24 hours post transfusion.

Variables		Paired T tests for immature reticulocyte fraction							
		Mean	Std. deviation	Std. error mean	95% confidence interval of the difference		T	Df	Sig. (2 tailed)
					Lower	Upper			
Pair 1	4 hours post transfusion – pre transfusion	3.6450	3.3620	0.5316	2.5698	4.7202	6.857	39	<0.001
Pair 2	12 hours post transfusion – pre transfusion	4.24650	3.95023	0.62459	2.98315	5.50985	6.799	39	<0.001
Pair 3	24 hours post transfusion – pre transfusion	2.29350	3.41771	0.54039	1.20046	3.38654	4.244	39	<0.001
Pair 4	12 hours post transfusion – 4 hours post transfusion	0.60150	2.51875	0.39825	-.20403	1.40703	1.510	39	0.139
Pair 5	24 hours post transfusion – 12 hours post transfusion	-1.95300	1.57661	0.24928	-2.45722	-1.44878	-7.834	39	<0.001

DISCUSSION

At our centre in Government Medical College and Hospital, Chandigarh, we conducted a prospective observational study to analyze the incidence and indications of blood component transfusion among obstetric patients. A total of 140 participants were included in this study. Our study showed a transfusion rate of 4.51% or 45.13 per 1000 obstetric admissions. This is similar to the study done by Bangal et al where the transfusion rate was 5.33%.[5]

Maximum study participants were in the age group of 21-25 years (34.28%) followed by 26-30 years (32.85%). The mean age of study participants was 28.16 5.15 years. Chowdhury et al in their study in Bangladesh in 2016 reported that transfusion rate in total admitted patients was 9.23%. The most common age group was between 21-30 years of age (76.58%).[6]

Majority of the subjects in our study who received blood product transfusion were multiparous (78.5%) and belonged to lower socioeconomic class (79.3%). Similar results were seen in a study conducted by Vasava et al in 2019 in which 79.3% of the participants who received blood product transfusion were multiparous and 92.1% of the participants belonged to the lower socioeconomic class. 55.7% of the participants resided in rural areas whereas 44.3% resided win urban areas. Vaid et al in their study made a similar observation, in which 62% of

participants were resident of rural areas and 38% were residents of urban areas.[7,8]

Among obstetrics patients who received blood product transfusion 33.6% were unbooked and 65.4% were booked. This is in accordance to observation made by Chowdhary et al.[6]

In our study 33.6% of the participants were unbooked and had 0 antenatal visits, 25.7% of the participants had <4 antenatal visits and were poorly supervised. Only 38.5% of the participants had 4 antenatal visits which fulfil the criteria for being adequately supervised under guidelines for antenatal care and skilled attendance at birth published by the Government of India under National health mission.[9]

In the present study, 47.1% of the participants received blood component transfusion in the intrapartum period, 28.6% in antenatal period and 23.6% in postpartum period. Hence peripartum transfusion was 70.7%. Vasava et al in their study reported antenatal, intrapartum and postpartum transfusions 65 (39.6%), 33 (20.2%) and 66 (40.2%) respectively. Hence, peripartum transfusion was 60.4%.[7]

44.3% of the participant gave no history of hematinic intake and 31.4% of participants gave history of irregular hematinic intake which is significant as anemia was found out to be the most common indication of blood component transfusion in our study. National iron plus initiative for anemia control launched by Ministry of Health and Welfare, Government of India recommends 100 mg of elemental iron and 500 mcg of folic acid daily for a 100 days after 1st trimester (14-16 weeks of gestation) which is then to be repeated at least for 100 days in post-partum period.

Most of the patients in our study required blood component transfusion because of anemia either in antenatal, intrapartum and post-partum period (42.1%). Anemia in these patients could be chronic, most commonly nutritional or acute as a result of blood loss. In order to avoid maternal and fetal complications it commanded blood component transfusion.

Other important causes requiring blood product transfusion included post-partum hemorrhage (20%), 1st trimester complications (16.4%) and antenatal hemorrhage (16.4%). Renuka et al in a study name “Blood transfusion needs among obstetric patients in a tertiary care hospital: a prospective observational study” observed similar findings to our study, anemia was responsible for 39.8% of all transfusions followed by post-partum hemorrhage (21.5%), antenatal hemorrhage was responsible for 16.8% of all transfusions. Similar results were seen in a study published by Bangal et al where anemia was responsible for 36.55% of all blood component transfusion.[5,10]

In our study first trimester complications were responsible for 16.4% of all transfusions. Ectopic accounted for 8.7% of the transfusions and abortions 8.7%. Similar observations were made by Pancholi et al in their study, where both abortions and ruptured ectopic were responsible for 10% each of all transfusions in obstetric patients. In total 1st trimester complications contributed to 20% of transfusions required by obstetric patients as per the study.[11]

Among 3rd trimester participants who received transfusion 56.1% (n=64/114) underwent LSCS while 43.9% (n=50/114) delivered vaginally. Women undergoing child birth via LSCS had a higher incidence of blood product transfusion than women delivering vaginally. Similar results were observed in other studies such as study conducted by Singh et al in 2016 and Vaid et al in 2020 where operational intervention was associated with higher incidence of blood product transfusion.[8,12]

In the present study 73.6% of participants received only PRBC transfusion, 5.7% only platelets concentrate transfusion and 0.7% only FFP transfusion. 20% of the subjects required transfusion of multiple types of blood products. Patel et al in their study conducted in 2018 reported similar incidences that 80% patients were transfused with PRBC only and 20% patients received combination of blood and blood products like FFP, PRC, and cryoprecipitate.[13]

Among the participants who received PRBC transfusion 31.4% received only 1 unit of PRBC, 45.7% received 2 unit PRBC, 10.7% received 3 unit PRBC and 5.7% received 4 or more PRBC transfusion. Similar results were seen by a study published by Pancholi et al in which 18.57% of the subjects received 1 unit PRBC transfusion, 42.8% were transfused 2 unit PRBC, 12.5% received 3 units of PRBC and 12.5% received 4 units of PRBC.[11]

In the present study, out of the 140 participants, 40 participants were selected to carry out a sub analysis. Hematological parameters including hemoglobin, hematocrit, platelet count, MCV, MCH, MCHC, reticulocyte count, immature reticulocyte fraction were noted pre transfusion, post 4 hours PRBC transfusion, post 12 hours’ transfusion and post 24 hours’ transfusion. These parameters were then compared to look for significant increase post transfusion. It was observed that the mean rise in hemoglobin post PRBC transfusion at 4 hours was 0.79 gm/dl, at 12 hours was 1.0 gm/dl and post 24 hours was 1.05gm/dl. The mean rise in hematocrit % post PRBC transfusion at 4 hours was 3.36%, at 12 hours was 3.14% and post 24 hours was 3.44%.

A common assumption among clinicians is that the transfusion of one unit of blood will result in a 3% increase in the hematocrit or 1 g/dl of hemoglobin. It has been implied that blood volume is expanded immediately after transfusion and does not return to normal for 24 hours.[14]

A study conducted by Hoque et al demonstrated Hb at 24 hours after-transfusion, rose more than 1 g/dl in patients

without active bleeding. Hoque et al also stated there was a significant increase in hemoglobin levels at 24 hours after-transfusion. Increase was seen when hemoglobin means before, and 6 hours after-transfusion were compared which was statistically significant. Comparison between Hemoglobin before, and 24 hours after-transfusion also increased significantly. Hemoglobin at 6 hours (8:03 g/dl) compared to 24 hours (8.78 g/dl) was significantly raised. These findings corroborated with the findings of our study where significant rise in mean hemoglobin was seen at 4 hours, 12 hours and 24 hours post PRBC transfusion when compared with pre transfusion hemoglobin levels.[15]

In our study there was a significant rise in mean reticulocyte count % of 0.32% and immature reticulocyte fraction % of 3.64% at 4 hours post PRBC transfusion. This was followed by a significant fall in mean reticulocyte count% of 0.08% and immature reticulocyte fraction % of 1.95% at 24 hours post transfusion.

Stripeli et al in 2018 published a study in among newborns in which a similar fall was seen in immature reticulocyte fraction 72-96 hrs post transfusion as compared to pre transfusion levels.[16]

Physicians should keep this in mind and avoid using reticulocyte count and immature reticulocyte fraction as an early parameter to assess post transfusion response as it takes at least 24 hours post transfusion to reach somewhat steady state of these parameters.

As it is rightly said, prevention is better than cure, 31.4% of the participants requiring PRBC transfusion received only a single unit of transfusion. These types of transfusions could have been avoided if better care had been taken of the mother during antenatal period. Thus during nine months' period, obstetrician must encourage pregnant women to maintain their hemoglobin level in normal range. Dietary advice regarding consumption of iron rich substances and prophylactic iron therapy, help in maintaining normal hemoglobin level. Moderate anemia may be treated with intravenous iron therapy in third trimester, so that hemoglobin rise takes place over few weeks' time. Blood transfusion should be spared for severe anemia at term or women having cardio respiratory symptoms.

The limitations of our study were that no control group was taken to compare the outcomes of our study so conclusive comparison could not be done. Further, our institute is a tertiary care hospital which caters to majority of complications in Punjab and Haryana belt. So the outcomes of this study cannot be generalized to population at large.

CONCLUSION

Our study was conducted to evaluate the incidence of blood component transfusion in obstetrics and the indications contributing to blood component transfusion in a tertiary care hospital in north zone of India. We also studied the impact of PRBC transfusion on hematological parameters of an individual.

The incidence ratio of blood component transfusion in our study was determined to be 45.13/1000 obstetric admissions. The most common indication of transfusion was found to be anemia, followed by postpartum hemorrhage and then antenatal hemorrhage and 1st trimester complications. Irregular antenatal care and irregular intake of hematinic were seen in majority of participants. This highlights the importance of proper and regular antenatal follow up, an area in which despite the countless government programs, India is still lacking.

The significance of early anticipation of complications like antenatal and postpartum hemorrhage cannot be undermined. Such complications require early and aggressive management. Early and adequate requisition for blood components should be made for such patients to ensure availability of safe blood components at the time of need.

Similar levels of rise were seen in hemoglobin and hematocrit levels of the participants post 4 hours, 12 hours and 24 hours of PRBC transfusion. Thus, it can be presumed the hematological stability is achieved at 4 hours post PRBC transfusion. This will give a clinical edge to the physician who will be able to evaluate the increment in blood parameters early and thus would be able to start early management and will also be able to reduce the hospital stay of patients.

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