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TRANSFUSION INDUCED ALLERGIC REACTIONS AMONG THE PATIENTS OF APLASTIC ANAEMIA - A CASE CONTROL STUDY FROM BANGLADESH.

Immunohematology

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ABSTRACT

Background: Allergic transfusion reactions (ALTR) are very common complication of blood transfusion. Advances in transfusion medicine have significantly decreased the incidence of ALTR; however, ALTR continue to be burdensome for transfusion dependent patients. It increases their existing sufferings. Allergic reaction is more common in platelet concentrate transfusion because stored platelet concentrate supernatants (PC-SNs) accumulate striking levels of biological response modifiers (BRMs) during storage.

Objective: To determine the risk factors of allergic reactions in platelate concentrate transfusion.

Method: It is a case control study enrolled a total of 64 diagnosed case of aplastic anaemia receiving transfusion of platelet concentrate at Department of Transfusion Medicine, BSMMU, Dhaka, from May 2015 to April 2016. Among them 32 case of aplastic anaemia having allergic reaction due to transfusion of platelet concentrate was considered as group I (case) and rest 32 patients not developed allergic transfusion reaction due to transfusion of platelet concentrate was considered as group II (control). Patients age belong to 5 - 50 years and both sex and also patients getting transfusion of plate late concentrate were enrolled in this study.

Statistical analysis: Statistical analyses were carried out by using the Statistical Package for Social Sciences version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Chi-Square test, Odds ratio with 95% CI used to analyze the categorical variables, shown with cross tabulation. Student t-test used for continuous variables. Significant value of 'p' was decided to be at a level of 0.05 in two tailed tests.

Result: The mean age was found 22.1±11.58 years in group I and 23.5±3.8 years in group II. Twenty four (75.0%) patients were male in group I and 17(53.1%) patients in group II. Almost twenty (62.5%) patients come from urban area in group I and 19(59.4%) in group II. In group I, thirty two (100.0%) patients had urticarial rash, 100.0% had itching, 37.5% had angioedema, 3.1% had cough, 3.1% had chest pain, 3.1% had respiratory distress, 3.1% had fever and 3.1% had vomiting. Almost twenty(62.5%) patients had tachycardia (>100 bpm) in group I and all patients had normal pulse in group II. Thirty two (100.0%) patients had normal blood pressure in both group. In group I, 31(96.9%) patients developed mild allergic reaction, 3.1% moderate allergic reaction. Majority (40.6%) patients belonged to age 16-30 years in present allergic transfusion reaction and 11(34.3%) in absent allergic transfusion reaction. Most (40.6%) of the patients was found blood group B in present allergic transfusion reaction and 11(34.4%) in absent allergic transfusion reaction. Multiple unit of PC transfusion increases 3.69 times risk to develop allergic transfusion reactions with 95% CI 0.99 to 14.44%. Platelet concentrate storage >3 days increases 5.95 times risk to develop allergic transfusion reaction with 95% CI 1.75 to 21.09%.

Conclusion: Multiple unit (≥2) transfusion and Platelet concentrate storage >3 days were significantly ($p<0.05$) associated with allergic transfusion reactions but no significant association was found between allergic transfusion reactions with age and Blood group.

KEYWORDS

Aplastic anemia, Transfusion Reaction, Angioedema, Allergic Reaction.

INTRODUCTION

The therapeutic uses of all blood products is defined as blood transfusion. It also named as life saving procedure. Rational uses of it has many clinical benefits though at the same time it has many risk factor. . Acute transfusion reaction is more common that includes allergic reaction, febrile reaction, transfusion related acute lung injury (TRALI) and transfusion associated circulatory overload (TACO). Among all the reactions, allergic reactions are more common[1].

By definition Aplastic anaemia is a syndrome of bone marrow failure that is characterized by peripheral pancytopenia and marrow hypoplasia. In this disease all types of blood cells are diminished. It is a common haematological disorder affecting men and women equally, both children and adult, and poses a severe health and economic burden to patients. This group of patient frequently faces allergic transfusion reaction that increases their existing suffering.

On the basis of severity, allergic transfusion reactions are categorized into three groups- mild or simple urtecarial reaction, anaphylactoid reaction and anaphylactic reaction. Among all the reactions urticarial reaction is more common[2].

Allergic reactions to transfusion form a continuum, with the vast majority clustered at the mild end, in the form of urticaria or hives-erythemetous, sharply circumscribed raised lesions, most often present over the upper trunk and neck usually associated with itching. The clinical manifestations of anaphylactoid reaction and anaphylactic reaction are almost similar. Both have systemic symptoms.

Anaphylactic transfusion reactions is the opposite end of hypersensitivity reaction spectrum .Presents usually acute hypotension, lower airway obstruction, abdominal distress, systemic crash. Virtually all of these patients have skin findings-urticaria, angioedema, generalized pruritis [2,3].

Anaphylactic shock develops very early in the transfusion. Only a few milliliters require for developing a severe form of reaction. However mild form of reaction takes longer time to develop. Usually fever is absent in these types of reactions. Though anaphylactic and anaphylactoid reactions are seen very few but urtecarial reaction is more common during transfusion practice[2, 4].

Allergic reaction occurs in transfusion of whole blood, plasma or cell. Plasma proteins are responsible for allergic reaction. Two possible etiologies have been proposed, based on the passive transfer of donor plasma to a patient after transfusion of blood component- presence of soluble substance in donor plasma that binds to preformed IgE antibodies on mast cells, resulting in activation and release of histamine from mast cells [2,4].

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Another one is donor plasma has foreign protein (allergen) with which IgE or IgG or both antibodies in patient plasma react. These antigen antibody complexes attach to the mast cells and cause degranulation of mast cell and release of histamine, serotonin and leukotrienes[5]. Histamine appears to be the primary mediator of allergic response. It increases vascular dialatation and permeability, allowing fluids in to the tissue. This causes swelling and raised red weals that may itch (puritus). Leukotriene is an another mediator that is 1000 times more potent than histamine[2,5].

Pathophysiology of anaphylactic and anaphylactoid reactions are slightly different anaphylactic reaction occurs IgA deficient patient who have associated class specific IgA antibodies. Anaphylactoid reactions occurs in patients having normal label of IgA but a limited type specific IgA that react with light chain(kappa or lambda) of the donor's IgA. However most of the IgA antibodies to which anaphylactic reactions are attributed are of the IgG or IgM class[3,5].

In another case report describe that allergic reactions have linked with HLA antibody (associated antibodies in platelate transfusion), anti c4 antibody in c4 deficient and anti haptoglobin antibody in haptoglobin deficient patient[2, 6].

From the last decade, lots of new discoveries have been implemented in the field of allergic diseases and transfusion medicine. At first, mast cells that are not the only cells which are key players in allergic diseases, specially in the murine immune system. In the second, immunologically active undigested or digested food allergens in a donor's blood which may be transferred to a recipient who is allergic to these antigens, causing anaphylaxis. Alternative putative mechanism that is underlying allergic transfusion reactions that is biological response modifiers (BRMs), like as inflammatory cytokines and chemokines, that's are accumulate in the blood components during storage, that are infused along with transfused blood and resulted in allergic reactions[7].

Platelet concentrate supernatants (PC-SNs) that is stored are accumulate striking levels of biological response modifiers (BRMs) during storage, including the vascular endothelial growth factor, soluble CD40 ligand, histamine, transforming growth factor-b1 and RANTES. Allergic reactions are occured for these.. For this reason platelet concentration causes more allergic reactions[2,8].

Objectives

- **General objective:**

To determine the risk factors of allergic reactions after platelate concentrate transfusion.

- **Specific objectives:**

1. To identify the association between allergic transfusion reactions with unit of platelet concentrate transfusion.
2. To find out the association between allergic reaction and platelate concentrate storage time.
3. To find out association between allergic transfusion reaction and blood group.
4. To determine the severity of allergic reaction among the platelet concentrate transfusion recepient.

METHODS AND MATERIALS

Study design:
It was a Case control study.

Place of study:
Department of Transfusion Medicine and Department of Haematology, Bangabandhu Sheikh Mujib Medical University, Dhaka.

Study period:
This study was conducted from May 2015 to April 2016.

Study population:
Diagnosed case of aplastic anaemia having allergic transfusion reaction who receive transfusion of platelet concentrate in the Department of Transfusion Medicine and Department of Haematology was taken as case and who not developed allergic transfusion reaction at the same Department was taken as control.

Selection of the study population:
Inclusion Criteria: (Case group)

a) Patients age belong to 5 - 50 years and both sex
b) Diagnosed case of aplastic anaemia having allergic transfusion reaction.
c) Patients getting transfusion of platelate concentrate.

Inclusion Criteria (Control group)
Patients suffering from aplastic anaemia but not having allergic transfusion reaction due to transfution.

Exclusion Criteria (Case group)

a) Patients who give atopic history.
b) Patient who are taking anti allergic drugs.
c) Patient who have history of any drug allergy.
d) Patient who are receiving RCC and whole blood.
e) Patient unwilling to give informed consent to take part in the study.

Exclusion Criteria (Control group):

a) Patients who give atopic history.
b) Patient who are taking anti allergic drugs.
c) Patient who have history of any drug allergy
d) Patient who are receiving RCC and whole blood.
e) Patient unwilling to give informed consent to take part in the study.

Screening method:
The preliminary screening panel for each patient was included the complete history and physical examination.

Sampling method:
Purposive sampling.

Sample size:
To determine the sample size the following formula was followed

$$n= \frac{P_0(1-P_0)+P_1(1-P_1)}{(P_0-P_1)^2}(Z_\alpha + Z_\beta)^2$$

n= sample size
Zα= 1.96 at 5% level of significant
Z_β = 0.85 at 80% of power
P_0 = Population proportion of case 0.3% (Kleinman et al. 2003)
P_1 = Population proportion of control group 0.05% (Kleinman et al. 2003)
So, n= 32.136
Number was 32 case and 32 control

Main outcome variables:
Allergic Transfusion reaction

Methods of data collection:
From May 2015 to April 2016 all patients of aplastic anaemia having allergic transfusion reaction who are receiving transfusion of platelet concentrate in the Department of Transfusion Medicine and Department of Haematology, BSMMU was taken as case. Patients suffering from aplastic anaemia but not having allergic transfusion reaction at the same Department of was taken as control.

Sample size were 64, of them 32 was case and 32 was control. The study was based on history taking, physical examination during and after transfusion. Baseline characteristics including age, sex, relevant clinical information like- pulse, Blood pressure, temperature, respiration rate, urticarial rash, angioedema, dyspnoea and other relevant data were recorded in a preformed data collection sheet.

Statistical analysis:
Statistical analyses were carried out by using the Statistical Package for Social Sciences version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA). The mean values were calculated for continuous variables. The quantitative observations were indicated by frequencies and percentages. Chi-Square test, Odds ratio with 95% CI used to analyze the categorical variables, shown with cross tabulation. Student t-test used for continuous variables. Significant value of 'p' was decided to be at a level of 0.05 in two tailed tests.

RESULTS AND OBSERVATIONS

Table I: Particular of the patients (n=64)

Particular of the patients	Group-I (n=32)		Group-II (n=32)		P value
	n	%	n	%	

Age (in years)					
≤15	12	37.5	12	37.5	
16-30	13	40.6	11	34.3	
>30	7	21.9	9	28.2	
Mean±SD	22.1±11.5		23.5+±3.8		[a]0.515[ns]
Range (min, max)	6, 42		9, 32		
Sex					
Male	24	75.0	17	53.1	[b]0.068[ns]
Female	8	25.0	15	46.9	
Residence					
Rural	12	37.5	13	40.6	[b]0.797[ns]
Urban	20	62.5	19	59.4	
Blood group (ABO)					
A	5	15.6	12	37.5	
B	16	50.0	8	25.0	[b]0.132[ns]
AB	3	9.4	3	9.4	
O	8	25.0	9	28.1	
Blood group (Rh)					
Positive	32	100.0	30	93.8	[b]0.246[ns]
Negative	00	0.0	2	6.3	

ns= not significant
[a]P value reached from unpaired t-test
[b]P value reached from chi square test

Group I: Case
Group II: Control

Thirteen (40.6%) patients belonged to age 16-30 years in group I and 11(34.3%) in group II. The mean age was found 22.1±11.58 years in group I and 23.5±3.8 years in group II. Twenty four (75.0%) patients were male in group I and 17(53.1%) patients in group II. Almost two third (62.5%) patients come from urban area in group I and 19(59.4%) in group II. Sixteen (50.0%) patients was found blood group B in group I and 8(25.0%) in group II. Thirty two (100.0%) patients was found positive blood group in group I and 30(93.8%) in group II. The difference were not statistically significant (p>0.05) between two groups.

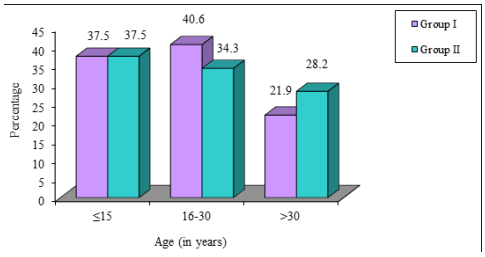

Figure 1: Bar diagram shows distribution of the study patients by age

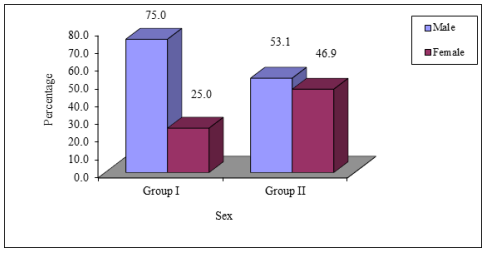

Figure 2: Bar diagram shows distribution of the study patients by sex

Table II: Distribution of the study patients by clinical symptom (n=64)

Clinical symptom	Group-I (n=32)		Group-II (n=32)	
	n	%	n	%
Urticarial rash	32	100.0	0	0.0
Itching	32	100.0	0	0.0
Angioedema	12	37.5	0	0.0
Cough	1	3.1	0	0.0
Chest pain	1	3.1	0	0.0
Respiratory distress	1	3.1	0	0.0
Fever	1	3.1	0	0.0
Vomiting	1	3.1	0	0.0
Pulse (bpm)				
Bradycardia (<60)	0	0.0	0	0.0
Tachycardia (>100)	20	62.5	0	0.0
Normal (60-100)	12	37.5	32	100.0
Blood pressure (mmHg)				
Hypotensive (sys-<100, dias-<60)	0	0.0	0	0.0
Normal (sys-110-140, dias-60-90)	32	100.0	32	100.0
Hypertensive (sys->140, dias->90)	0	0.0	0	0.0

In group I, Thirty two (100.0%) patients had urticarial rash, 32(100.0%) had itching, 12(37.5%) had angioedema, 1(3.1%) had cough, 1(3.1%) had chest pain, 1(3.1%) had respiratory distress, 1(3.1%) had fever and 1(3.1%) had vomiting.

Twelve (37.5%) patients was found normal (60-100 bpm) pulse in group I and 32(100.0%) in group II. Thirty two (100.0%) patients were normal blood pressure in group I and group II respectively.

Table III: Distribution of the study patients by severity of allergic reaction in group I (n=32)

Severity of allergic reaction	Number of patients	Percentage
Mild	31	96.9
Moderate	1	3.1
Severe	0	0.0

In group I, Thirty one (96.9%) patients were mild and 1(3.1%) were moderate severity of allergic reaction.

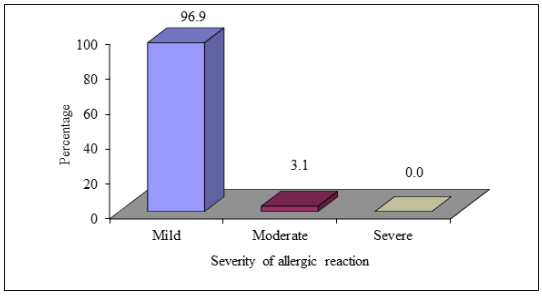

Figure 3: Bar diagram shows Severity of allergic reaction of the study patients

Table IV: Association between allergic transfusion reaction with age (n=64)

Age (in years)	Allergic transfusion reaction				P value
	Present(n=32)		Absent(n=32)		
	n	%	n	%	
≤15	10	31.3	14	43.8	
16-30	13	40.6	11	34.3	0.582ns
>30	9	28.1	7	21.9	

ns= not significant
P value reached from chi square test

Thirteen (40.6%) patients belonged to age 16-30 years in present allergic transfusion reaction and 11(34.3%) in absent allergic transfusion reaction. The difference was not statistically significant (p>0.05) between two groups.

Table V: Association between allergic transfusion reaction with blood group (n=64)

Blood group	Allergic transfusion reaction				P value
	Present (n=32)		Absent(n=32)		
	n	%	n	%	
A	7	21.9	10	31.3	0.860[ns]
B	13	40.6	11	34.4	
AB	3	9.4	3	9.4	
O	9	28.1	8	25.0	

ns= not significant
P value reached from chi square test

Thirteen (40.6%) patients was found blood group B in present allergic transfusion reaction and 11(34.4%) in absent allergic transfusion reaction. The difference was not statistically significant (p>0.05)

between two groups.

Table VI: Distribution of the study patients by risk factors of allergic transfusion reaction (n=64)

No of transfusion	Allergic transfusion reaction				P value
	Present(n=32)		Absent(n=32)		
	n	%	n	%	
Multiple unit	27	84.4	19	59.4	0.026[s]
Single unit	5	15.6	13	40.6	
Platelet concentrate storage (days)					
>3	25	78.1	12	37.5	0.001[s]
1-3	7	21.9	20	62.5	
Blood group					
A	7	21.9	10	31.3	0.860[ns]
B	13	40.6	11	34.4	
AB	3	9.4	3	9.4	
O	9	28.1	8	25.0	

s= significant, ns= not significant
P value reached from chi square test

Twenty seven (84.4%) patients was found multiple unit of transfusion in present allergic transfusion reaction and 19(59.4%) in absent allergic transfusion reaction. Twenty five (78.1%) patients had platelet concentrate storage >3 days in present allergic transfusion reaction and 12(37.5%) in absent allergic transfusion reaction. The difference was statistically significant (p<0.05) between two groups. Thirteen (40.6%) patients was found blood group B in present allergic transfusion reaction and 11(34.4%) in absent allergic transfusion reaction. The difference was not statistically significant (p>0.05) between two groups.

Table VII: Association between allergic transfusion reaction with no of transfusion (n=64)

No of transfusion	Allergic transfusion reaction				OR (95%CI)	P value
	Present (n=32)		Absent (n=32)			
	n	%	n	%		
Multiple unit	27	84.4	19	59.4	3.69 (0.99-14.44)	0.026s
Single unit	5	15.6	13	40.6		

s= significant, ns= not significant
P value reached from chi square test

Twenty seven (84.4%) patients was found multiple unit of transfusion in present allergic transfusion reaction and 19(59.4%) in absent allergic transfusion reaction. Twenty five (78.1%) patients had platelet concentrate storage >3 days in present allergic transfusion reaction and 12(37.5%) in absent allergic transfusion reaction. The difference was statistically significant (p<0.05) between two groups. Thirteen (40.6%) patients was found blood group B in present allergic transfusion reaction and 11(34.4%) in absent allergic transfusion reaction. The difference was not statistically significant (p>0.05) between two groups.

Table VII: Association between allergic transfusion reaction with no of transfusion (n=64)

No of transfusion	Allergic transfusion reaction				OR (95%CI)	P value
	Present(n=32)		Absent(n=32)			
	n	%	n	%		
Multiple unit	27	84.4	19	59.4	3.69 (0.99-14.44)	0.026s
Single unit	5	15.6	13	40.6		

OR= odds ratio
s= significant
P value reached from chi square test

Twenty seven (84.4%) patients was found multiple unit of transfusion in present allergic transfusion reaction and 19(59.4%) in absent allergic transfusion reaction. Multiple unit of transfusion is 3.69 times increase risk to develop allergic transfusion reaction with 95% CI 0.99 to 14.44%. The difference was statistically significant (p<0.05) between two groups.

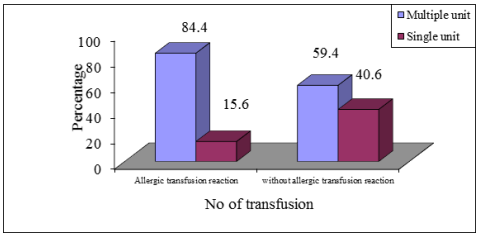

Figure 4: Bar diagram shows No of transfusion of the study patients

Table VIII: Association between allergic transfusion reaction with platelet concentrate storage (n=64)

Platelet concentrate storage (days)	Allergic transfusion reaction				OR (95%CI)	P value
	Present(n=32)		Absent(n=32)			
	n	%	n	%		
>3	25	78.1	12	37.5	5.95 (1.75-21.09)	0.001s
1-3	7	21.9	20	62.5		

OR= odds ratio
s= significant
P value reached from chi square test

Twenty five (78.1%) patients had platelet concentrate storage >3 days in present allergic transfusion reaction and 12(37.5%) in absent allergic transfusion reaction. Platelet concentrate storage >3 days is 5.95 times increase risk to develop allergic transfusion reaction with 95% CI 1.75 to 21.09%. The difference was statistically significant (p<0.05) between two groups.

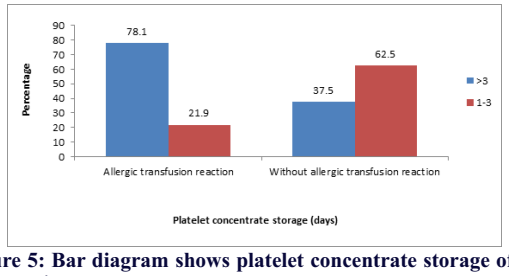

Figure 5: Bar diagram shows platelet concentrate storage of the study patients

DISCUSSION

This case control study was carried out with an aim to identify the association between allergic transfusion reactions with unit of platelet concentrate transfusion and to find out the association between allergic reaction and platelate concentrate storage time as well as to determine the severity of allergic reaction among the platelet concentrate transfusion recipient.

A total of 64 diagnosed case of aplastic anaemia received transfusion of platelet concentrate in the Department of Transfusion Medicine and Department of Haematology, Bangabandhu Sheikh Mujib Medical University, Dhaka during May 2015 to April 2016 were included in this study. Among them 32 case of aplastic anaemia having allergic reaction due to transfusion of platelet concentrate was considered as group I (case) and rest 32 patients not developed allergic transfusion reaction due to transfusion of platelet concentrate was considered as group II (control). Patients age belong to 5 - 50 years and both sex and also patients getting transfusion of platelate concentrate were enrolled in this study. Patients who give atopic history, patient who were taking anti allergic drugs, patient who had history of any drug allergy, Patient who are receiving RCC and whole blood and patient unwilling to have informed consent to take part in the study were excluded. The present study findings were discussed and compared with previously published relevant studies.

In this present study it was observed that majority (40.6%) patients belonged to age 16-30 years in group I and 11(34.3%) in group II. The mean age was found 22.1±11.58 years varied from 6 - 42 years in group I and 23.5±3.8 years varied from 9 - 32 years in group II. The difference was not statistically significant (p>0.05) between two groups, which indicates that there is no relationship between age and allergic reactions. Similarly, Chowdhury et al. enrolled a total number of 120 patients between 5 years to 65 years with mean age of patients was 25.91±13.89 year[1].

In this current study it was observed that three fourth (75.0%) patients were male in group I and 53.1% in group II. The difference was not statistically significant (p>0.05) between two groups. Bhattacharya et al. found 24 males and 12 females[14].

In this series it was observe that almost two third (62.5%) patients came from urban area in group I and 59.4% in group II. The difference was not statistically significant (p>0.05) between two groups. In this study it was observed that half (50.0%) patients was found blood group B in group I and 25.0% in group II. The difference was not statistically significant (p>0.05) between two groups. Chowdhury et al. found most of the patients (45.0%) were group B, 30.0% were group O, 19.16% were group A and 5.83% were Group AB[1].

In this present study it was observed that all (100.0%) patients were found positive blood group in group I and 93.8% in group II. The difference was not statistically significant (p>0.05) between two groups. In another study Chowdhury et al. found in Rh D typing only 1.6% were Rh D negative and rest 98.41% were Rh D positive, which is comparable with the current study[1].

Anaphylactic transfusion reactions is the opposite end of hypersensitivity reaction spectrum. Presents usually acute hypotension, lower airway obstruction, abdominal distress, systemic crash. Virtually all of these patients have skin findings-urticaria, angioedema, generalized pruritis (Chaffin 2012). In this current study it was observed that in group I, all (100.0%) patients had urticarial rash, 100.0% had itching, 37.5% had angioedema, 3.1% had cough, 3.1% chest pain, 3.1% respiratory distress, 3.1% fever and 3.1% had vomiting.

Buck et al. found reactions 19.0% were urticarial, 66.0% were febrile, and 15.0% were severely allergic with or without anaphylaxis[12]. Wilhelm et al. reported their analysis of 57 nonhemolytic transfusion reactions to platelet transfusion and found that 51.0% of these reactions were allergic, followed by 32.0% febrile reactions and 17.0% were classified as circulatory distress[13]. In describing the reactions,they noted that the first NHFTR to platelet transfusion was often mild (rash, itching) but after repeated transfusion, reactions occurred almost immediately and with an increasing severity (i.e. shock). They found that 93% of all patients experiencing allergic transfusion reactions had IgE antibodies[10]. Bhattacharya et al. found that clinical signs and symptoms that appeared in patients of allergic reactions according to the decreasing order of frequency were rash 76.0%, pruritus 33.0%, periorbital edema 10.8%, wheals 8.0%, cough 5.4%, chills 2.7%, and vomiting 2.7%. WB and PRBC were implicated in 27 cases, platelets are implicated in 6 cases, and plasma was implicated in 3 cases[14]. In short , a 6-year-old boy had an anaphylactic reaction with rash, angioedoema, hypotension and difficult breathing during a PLT transfusion. Plasma Hp levels should be carefully measured because they are known to decrease to below detectable levels in certain pathological conditions, such as haemolysis and liver dysfunction. In these instances, a DNA diagnosis of Hp deficiency is useful [11].

In this current series it was observed that 62.5% patients had tachycardia (>100 bpm) in group I and all patients had normal pulse in group II. All (100.0%) patients had normal blood pressure in both group.

In this series it was observed that in group I, 31(96.9%) patients developed mild allergic reaction, 3.1% moderate allergic reaction and severe allergic reaction was not found. Rahman et al. study found total transfusion reactions were 10%[10]. In another study done at BSMMU reactions were 8.0% [9]. The rate of transfusion reaction gradually decreasing, it may be due to improvement of quality. In Chowdhury et al. study allergic reaction observed 25.0%. Reactions were mild and characterized by hives and some skin manifestation. No anaphylactic reaction or severe reaction occurred[1].

Moore et al. reported a 3.0% rate of mild allergic reactions from. This mild allergic reaction was defined as hive or localized urticaria[15]. In Bhattacharya et al. study, it was 0.87% with red cells, 2.45% with platelets, and 0.47% with FFP. Higher incidence with platelet transfusion was seen in hemato-oncology patients[14]. Although most IgA-related anaphylactic reactions occur in those who are IgA-deficient (serum IgA <0.5 mg/l) and in whom there are detectable serum class-specific IgA antibodies, there are patients with normal serum concentrations of IgA and subclass (IgA1 or IgA2)- or allotype [IgA2m(1) or IgA2m (2)]-specific IgA antibodies who have experienced severe acute reactions to blood transfusions[16].

In this current study it was observed that majority (84.4%) patients was found multiple unit of transfusion in present allergic transfusion reaction and 59.4% in absent allergic transfusion reaction. Multiple unit of transfusion is 3.69 times increase risk to develop allergic transfusion reaction with 95% CI 0.99 to 14.44%. Multiple unit significantly (p<0.05) association with allergic transfusion reaction. Similarly, Chowdhury et al. there was a strongly positive relationship between transfusion reaction and unit on transfusion[1]. That means increasing the number of transfusion, increasing the chance of reaction. Tan et al. found that allergic reaction was relatively common with repeated transfusion and tendency to develop reaction increase with the number transfusion increases leukocyte free cell should be the treatment of choice for multiple transfused patient as leukocyte are the important cause of transfusion reaction, which is closely resembled with the present study[11].

In this series it was observed that more than three fourth (78.1%) patients had platelet concentrate storage >3 days in present allergic transfusion reaction and 37.5% in absent allergic transfusion reaction. Platelet concentrate storage >3 days is 5.95 times increase risk to develop allergic transfusion reaction with 95% CI 1.75 to 21.09%. Platelet concentrate storage >3 days were significantly (p<0.05) association with allergic transfusion reaction. Since these transfusion reactions occur with different frequencies in red cells and platelet components and can occur virtually with the onset of transfusion in patients not previously transfused or pregnant and can vary with the age and content of the product suggests that multiple causes may be responsible for these patient symptoms[8]. Heddle et al. also reported that blood product age predicted transfusion reactions. Transfusion reactions were fivefold greater in platelets and the older the platelet product and the higher the white cell count the more likely upon transfusion a reaction would occur[8].In subsequent studies Muylle et al. tested their hypothesis that transfusion reactions to platelet transfusion were more frequent and more severe after storage of the platelets for 3 days[17]. A Canadian group showed similar allergic reaction incidences with PLTs and RBCs and an allergic reaction incidence of 0.19% with plasma transfusions[18]. By this way , transfusions with PLTs are apparently associated with a greater risk than those with other components, though it is unknown whether these differences are due to the nature of each component or patient factors, including background diseases and history of previous transfusions. PLT that are stored concentrate supernatants (PC-SNs) accumulate striking levels of BRMs during storage, including vascular endothelial growth factor, soluble CD40 ligand, histamine, transforming growth factor-β1 and RANTES[19]. For this reason to believe that these molecules are infused at what may be clinically significant doses and possibly alter a recipient's immune functions. Though the roles of these BRMs in the onset of allergic reactions remain largely unknown, that is possible that these or other substances induce or modulate allergic reactions. The above findings are comparable with the current study.

CONCLUSION

This study was undertaken to determine the risk factors of allergic reaction in platelate concentrate transfusion. Age, sex, residence, Blood group (ABO) and Blood group (Rh) were almost alike between two groups. Regarding the clinical symptom urticarial rash, itching, angioedema and Tachycardia were more common in patients having developed allergic reaction in platelate concentrate transfusion and mild allergic reaction (urticarial rash, itching) was more frequent. Multiple unit (≥2) transfusion and Platelet concentrate storage >3 days were significantly (p<0.05) association with allergic transfusion reaction but no significant association between allergic transfusion reaction with age and Blood group.

Limitation

1. The study population was selected from one selected hospital in Dhaka city, so that the results of the study may not be reflect the exact picture of the country.
2. The present study was conducted at a very short period of time. And the sample size was less.

Recommendations

- Further studies can be undertaken by including large number of patients.

- Platelet should be transfused as soon as possible after preparation.
- Storage temperature should be maintain properly
- Selection of donor should be done carefully
- Quality control should be maintain in all steps of preparation of platelet concentrate.

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