International Journal of Community Medicine and Public Health
Akhter N et al. Int J Community Med Public Health. 2019 Apr;6(4):1416-1421
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20191369

Original Research Article

Acute blood transfusion reaction in a tertiary care hospital in Southern Punjab, Pakistan

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Received: 03 February 2019
Revised: 12 March 2019
Accepted: 13 March 2019

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ABSTRACT

Background: Blood transfusion is a lifesaving process but carries many risks. Majority of these had been reduced with better diagnostic and management strategies. But the risk of non-infectious adverse transfusion reactions though reduced but cannot be eliminated. Hemovigilance is the system to monitor such reactions.
Methods: The objective of current study was to know the frequency of adverse transfusion reactions and to compare it with local and international data. Retrospective cross-sectional descriptive study was done in Ibn-e- Sina hospital. Adverse transfusion reactions reported to blood bank was analysed according to hospital protocol.
Results: Out of 6050 blood transfusions 23 (0.38%) develop adverse transfusion reactions. Febrile nonhemolytic transfusion reaction was the commonest adverse event and whole blood was the component implicated.
Conclusions: Adverse transfusion reactions are non-infectious complications of blood transfusion which in spite of all efforts cannot be avoided. Frequency of adverse transfusion reactions in our study was 0.38% and Febrile nonhemolytic transfusion reaction was commonest reported reaction type. Hemovigilance system is necessary to monitor, investigate and control such activities.

Keywords: Adverse transfusion reaction, Pack red cells, Hemovigilance, Febrile nonhemolytic transfusion reaction

INTRODUCTION

Blood transfusion is one of the lifesaving processes and like other processes free of hazards.[1-6] Infection transmission is a great danger which is called transfusion transmitted infection, which exerts a huge burden on healthcare system.[1-7] But has reduced morbidity and mortality to a significant extent.[8] Pakistan is a developing country with a population over 180 million where almost 1.2 million donations are given per year.[9,10] The under developed transfusion system in Pakistan is under process of development.[11]

In addition to the infectious complications, there is a risk of non-infectious transfusion reactions; these are called adverse transfusion reactions. There are different types of adverse transfusion reactions and are classified as acute (occurring within 24 hours) and delayed (occurring after 24 hours). These adverse transfusion reactions include the following;[12-14] (i) haemolytic transfusion reaction; immune and non-immune, (ii) transfusion related lung injury (TRALI), (iii) allergic reactions, (iv) sepsis, (v) transfusion associated circulatory overload (TACO), (vi) febrile non haemolytic transfusion reaction (FNHTR), (vii) non-specific transfusion reaction.

The reported incidence of adverse transfusion reaction is 0.2% to 10% ad causing death in approximately 1 250000.[13,15] With better diagnostic procedures and donor screening the infectious complications of the blood transfusion has been decreased, though non-infectious complication risk is also reduced but still high. These reactions occur due to the cytokines and antibodies in the stored blood. The features of adverse transfusion reactions may occur during the transfusion or within 24 hours of transfusion.[16,17]

Because of the unpredictable nature of the adverse transfusion reaction it is extremely necessary to have a system for monitoring, evaluating and reporting the transfusion reaction. Such system is called the homovigilance system. In the developed world it is very developed system. Such hemovigilance system was first developed in France in 1994 and now is adopted all over the World. In England, they have serious hazard of transfusion (SHOT) and was established just after France in 1996.[18-23]

In Pakistan hemovigilance system is not developed, nor centralized. Some of the hospitals have made it compulsory to report the adverse transfusion reaction and also returning the blood transfusion proforma to the blood bank after completion of blood transfusion. Our hospital is one example of such hospital.

So the aim of the current study was to know the adverse transfusion reactions in our tertiary care hospital, also to know which reaction type is most frequent, in which patients and also to compare with other studies.

METHODS

It was a retrospective descriptive cross-sectional study. It was done in blood bank of Ibn-e-Sina hospital, a tertiary care hospital in Multan. He study was conducted from January, 2016 to December, 2018, over a period of three years. Ethical approval was taken from the ethical committee. All the transfusion reactions occurred over this period were noted an analysed as per hospital protocol that was prepared according to the healthcare commission guidelines.

Table 1: Definition of different types of ATRs in accordance with the AABB and CDC criteria.[24,25]

Type	Etiology	Clinical presentation
Febrile non-hemolytic transfusion reaction (FNHTR)	Cytokines in donor platelets or antibodies to donor leukocytes	Fever (≥1°C increase and ≥38.0°C body temperature) within the first four hours of transfusion and/or chills/rigors without any evidence of infection or other conditions causing fever
Allergic reaction	Antibodies to donor plasma proteins	Urticaria, pruritus, rash, edema, or flushing within the first four hours of transfusion and/or itching sensation without any evidence of other conditions causing allergic reactions
Transfusion-associated dyspnea (TAD)		Acute respiratory distress within the first 24 hour of transfusion without any evidence of other conditions causing similar symptoms, and when TACO and TRALI have been ruled out
Transfusion-associated circulatory overload (TACO)	Volume overload	Gallop, jugular venous distension, cough, or dyspnoea within the first six hours of transfusion with elevated BNP and CVP with radiologic evidence of pulmonary edema without any evidence of other conditions causing circulatory overload
Transfusion-related acute lung injury (TRALI)	Leukocyte antibodies in donor or recipient	Respiratory failure, hypotension, fever within the first six hours of transfusion with the evidence of hypoxemia (PaO2/FiO2 ≤300 mm Hg and SaO2 <90% in room air) with radiologic evidence of pulmonary edema without evidence of circulatory overload (PCWP ≥18 mm Hg) and other conditions causing acute lung injury
Hypotensive transfusion reaction (HTR)		Hypotension (≥30 mm Hg drop and ≤80 mm Hg systolic blood pressure) within the first four hours of transfusion without any evidence of other conditions causing hypotension

Abbreviations: AABB: American association of blood banks; CDC: centres for disease control and prevention; ATR: adverse transfusion reaction; BNP: brain natriuretic peptide; CVP: central venous pressure; PCWP: pulmonary capillary wedge pressure.

The following investigations were done in our department in case of blood transfusion reaction: (1) rechecking for clerical error-document check, (2) post transfusion sample of patient and blood left in bag for any abnormality like bacterial culture, (3) post transfusion sample for direct and indirect coomb's test, (4) blood grouping and cross match on both pre and post transfusion sample, (5) post transfusion urine sample for haemoglobinuria and myoglobinurea.

Transfusion reaction analysis proforma was filled and according to the results of these investigations, it was classified as acute (occurring within 24 hours) or delayed (occurring after 24 hours). Different types of reactions were classified according to AABB manual and CDC criteria as discussed in Table 1. All the data were analysed using SPSS v 20 Frequency of gender, blood transfusion reactions and its types and type of blood component therapy were presented as percentage.

RESULTS

Over this period of three years a total of 6050 blood component were issued to different wards. Age of the patients ranged from three months to 78 years. Out of these 23 (0.38%) adverse transfusion reactions were reported. Among these, the male to female distribution is shown in Figure 1.

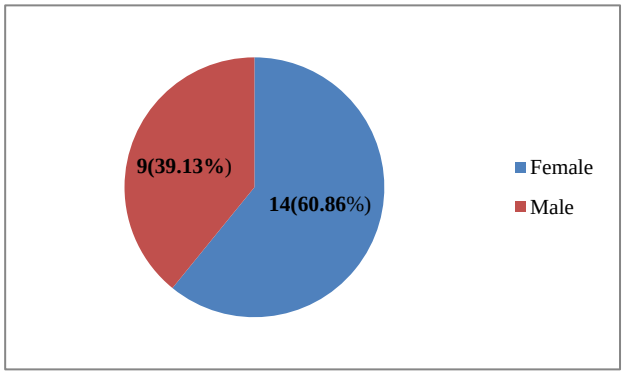

Figure 1: Sex distribution in patients with adverse transfusion reactions.

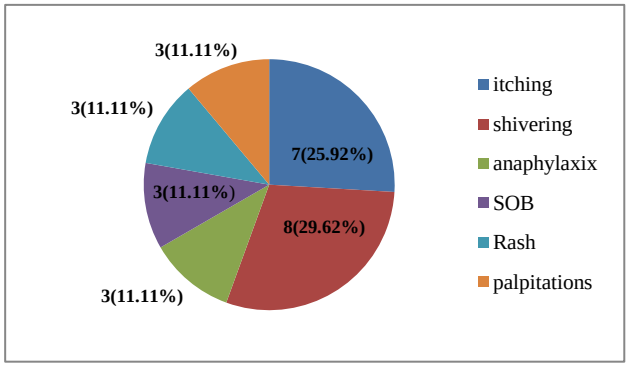

Figure 2: Different types of symptoms in patients with adverse transfusion reactions.

The commonest reported symptoms were shivering followed by itching as shown in Figure 2.

The most frequent type of adverse transfusion reported was FNHTR, followed by allergic reaction and anaphylactic reaction respectively, depicted in Figure 3.

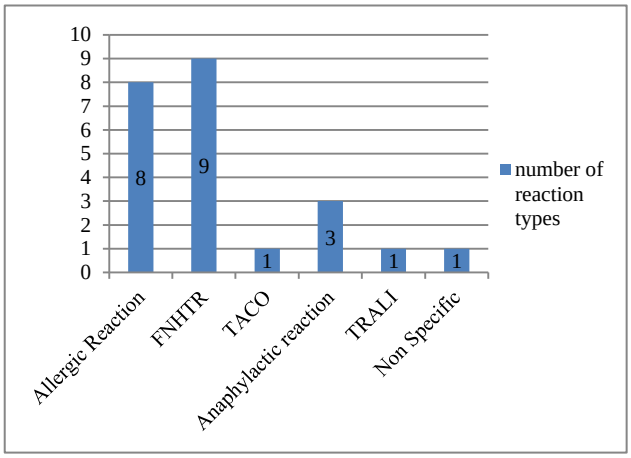

Figure 3: Number of different types of reactions.

About 60.86% patient those who develop adverse transfusion reaction were gynaecological patients while 26.08% were from surgical ward, as shown in Figure 4.

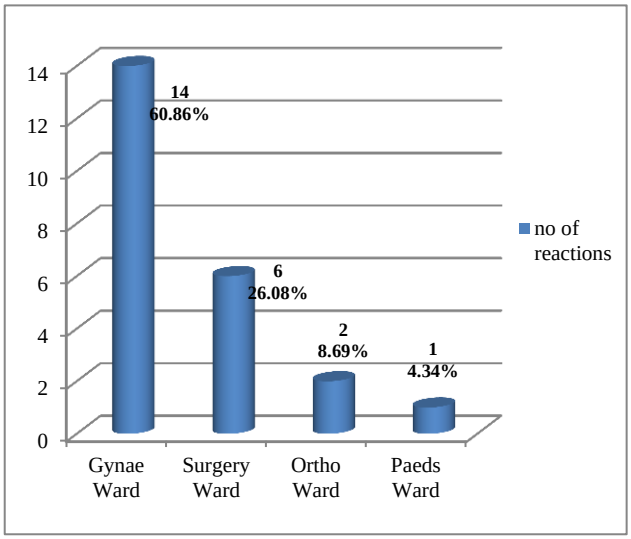

Figure 4: Number of reaction in different wards.

When it was analysed about the type of component which was frequently to adverse transfusion reaction, it was formed to be whole blood (73.91%) followed by pack red blood cells. No reaction was observed with fresh frozen plasma and platelets Table 2.

The distribution of different blood groups who had adverse transfusion reactions were as follow; 10 (43.47%) O-positive, 10 (43.47%) B-positive and 03 (13.04%) A-positive respectively (Table 3).

Table 2: Distribution of component type related to transfusion reaction.

Component type	Number	%
Whole blood	17	73.91
Packed red blood cells	06	26.09
Fresh frozen plasma	0	0
Platelet concentrate	0	0

Table 3: Distribution of different blood groups who had transfusion reaction.

Blood group	Number	%
O positive	10	43.47
B Positive	10	43.47
A Positive	03	13.04

DISCUSSION

Adverse transfusion reactions are unavoidable transfusion risk of blood transfusion. This study was conducted to evaluate the transfusion reaction reported to blood bank of the Ibne-Sina hospital evaluation protocol was clinical examination laboratory workup.

The transfusion reaction reported to the blood bank may not be the actual number; it is signified by many factors, like patients are receiving multiple transfusion, unused issued blood, blood products not returned to the blood bank or discarded and inability to identify the blood transfusion reaction. All these factors contribute towards reporting of the ATR.[18,22]

Over the period of 3 years a total of 6050 transfusion done ad 23 cases of adverse transfusion reactions was 0.38%. It was quite high as compared to other studies reported in Pakistan like 0.15% by Borhany et al and 0.2% by Safoorah et al and the reported frequency of ATR in India is 0.3%, 0.27%, 0.18%, 0.28%respectively.[14,18,21,22] One study from Korea showed the incidence of 1.2%.[16] The frequency of ATR in our study is high as compared as compared to other local studies; this may be due to the strict policy of returning the transfusion programme to the blood bank after completion of blood transfusion.

The most frequent ATR in our study was FNHTR followed by allergic reactions. Both of these two account for 2/3 of ATR. Our results in conformity with another study conducted in Pakistan by borhany et al and sadaf et al.[13,20] The most frequent symptoms reported was itching, shivering SOB, palpitation and rash respectively.[14,20] Majority of our patients experienced minor symptoms. Incidence of anaphylactic reactions in our study is high compared to others. It was 11.11% one case of TRALI was also reported, while it was not reported in most studies in Pakistan and other countries. It may be due to the difficulty in identifying the condition.[13,15,20]

The comparison with local and international studies regarding blood transfusion reactions is given in the Table 4.

Table 4: Comparison with local and international studies.

Author	Place of study	ATR (%)	Commonest reaction type	Component type	Reference
Sadaf et al	Multan, Pakistan	2.7	FNHTR	Whole blood	13
Safoorah et all	Karachi, Pakistan	0.093	FNHTR	PRBC	15
Borhany et al	Karachi, Pakistan	0.15	Allergic reactions	PRBC	20
Chakkravarty et al	India	0.16	FNHTR	-	14
Khoyumthem et al	India	0.09	Allergic reactions	PRBC	12
Sidhu et al	Kashmir	0.27	Allergic reaction	Whole blood	18
Chavan et al	India	0.3	Allergic reaction	Whole blood	21
Sinha et al	India	0.27	Allergic reaction	Whole blood	22
Allisabanavar et al	India	0.18	FNHTR	Whole blood	23
Cho et al	Korea	1.2	FNHTR	PRBC	16
Hatayama et al	Japan	1.5	Allergic reaction	Platelets	17
Akhter et al	Multan, Pakistan	0.38	FNHTR	Whole blood	Current study

The frequency of transfusion reactions in this study was 0.38%. This reaction rate may not be the true incidence of the reaction rate and we may be under estimating the reaction rate due to under reporting of the reaction rate. Under reporting can be improved by raising awareness about transfusion reactions and implying hemovigilance system. The rationale use of blood components, monitoring and documentation of adverse transfusion reactions has been shown by this study. So the monitoring and knowledge of adverse transfusion reactions can help in identification and timely management of these. It is the responsibility of the blood transfusion officer and physician to raise awareness about safe blood transfusion practices. So the hemovigilance system should be developed for patient safety. This study may be a milestone towards this.

ACKNOWLEDGEMENTS

The authors would also like to acknowledge the donor's area for their support and the ethics committee for their approval to conduct this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Akhter N, Samad A, Fayyaz N, Habiba U, Asif M, Fatima S. Acute blood transfusion reaction in a tertiary care hospital in Southern Punjab, Pakistan. Int J Community Med Public Health 2019;6:1416-21.