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Red Cell Alloimmunization in Multi-Transfused Pregnant Women

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ABSTRACT

BACKGROUND

Though transfusion of whole blood and its components is an essential part of patient management in modern medicine, it is not without risks; one being the formation of antibodies against one or more erythrocyte antigens when exposed to the said antigen through transfusion, pregnancy or transplantation.The resultant Alloimmunization (due to genetic disparity between donor-recipient or mother-fetus RBC antigen) is much troublesome and limits the utility of transfusion. Thus screening and detection of clinically significant antibodies among antenatal women is merited.

OBJECTIVE

To study the frequency and spectrum of red cell Alloimmunization among multi-transfused pregnant women at a tertiary care hospital in Hyderabad, Pakistan.

METHODOLOGY

A total of 56 consenting pregnant women (irrespective of age, parity and gestational age) were made to undergo antibody screening and antibody identification test. Three-cell antibody screening was performed using antihuman globulin gel cards (ID-Card LISS/Coombs) and three-cell panel (ID-DiaCell I, II, III). Those with positive antibody screening were analyzed further for antibody identification test using eleven cell panel (Set ID-Dia Panel).

RESULTS

The frequency of alloantibodies in pregnant women in this study was 12.5%, with 6 red cell antibodies being detected. The incidence of non-anti-Dwas (66.66%) in all pregnant females.The non-anti-Dallo antibodies included anti-k (33.33%), anti-E (16.66%), antic (16.66). The incidence of anti-D was 33.33% in D negative blood type.

CONCLUSION

After careful consideration, it can be concluded that Alloimunization is sufficiently common (with the incidence of non-anti-D Alloatibodied being particularly high) among multi-transfused pregnant women to recommend screening of maternal serum alloantibodies against red cells in D positive women (with previous unexplained fetal loss), in the early trimester of pregnancy (in conjunction with doppler studies) so that timely treatment strategies may be employed wherever necessary.

KEYWORDS

Red Cell Alloimmunization, Blood Transfusion, Hemolysis, Non Anti-D Alloantibodoes and D Negative Blood.

INTRODUCTION

The transfusion of whole blood and its products is vital part of patient management in modern medicine. [1]Formation of antibodies against erythrocyte antigens is one of the hazards faced especially by individuals faced to erythrocyte antigen through various modes like pregnancy, transfusions and transplantations. [2,3]One such event is Alloimmunization, wherein antigen disparity between mother-fetus and donor-recipient leads to anti-body formation. [4,5]

The said red cell alloantibodies are capable of accelerating destruction of RBCs bearing the

corresponding antigen. AntiRh, antiK, antiFy and anti J Kare clinically significant Alloantibodies capable of causing hemolysis in transfused patients and resulting in major complications. [6]More than 300 RBC antigens now have been explored and organized in 36 systems as per International Society of Blood Transfusion (ISBT). ABO, Rhesus, Kell, Kidd, Duffy, MNS, P, Lewis, and Lutheran systems are particularly reflected to be clinically important.[7]

Transfusion reactions, hemolytic disease of fetus and newborn (HDFN) and logistic problems pertaining to obtaining compatible RBCs for the patients are among the few challenges that Alloimmunization poses.The situation becomes more difficult to navigate in developing countries such as Pakistan where only ABO and D status are typed for cross-match prior to transfusion; hence increasing the probability of adverse events, especially when the high incidence of maternal anemia prevalent in the country merits frequent transfusion.[?]

As per BCSH standard guidelines pregnant women should be screened and typed early in pregnancy for ABO and D antigen and for alloantibodies in 28th week of gestation. [8]Because in compatibility testing only ABO matched blood is checked, so the chances of Alloimmunizationis raised for minor groups antigens. [9]The fact that Drug Administration in the USA has described RBC alloantibodies as a main cause of serious hemolytic transfusion reactions and considered ita subsequent important cause of deaths due to transfusion, further necessitates screening.[10]

It is believed that immuno-hematological tests on all high risk pregnant women throughout pregnancy to identify the occurrence of Alloantibodies (to enhance transfusion safety) may yield better pregnancy outcomes. [18]Present study is commenced in multi-transfused pregnant women of all age groups irrespective of any gestation age to find out the rate of erythrocyte Alloimmunization in repeatedly transfused pregnant women and will aid to better understanding of the problem and will help the future policy for management.[21]

METHODOLOGY

This descriptive – cross-sectional study was conducted upon a total of 56 consenting, multi-transfused (transfused at least 5 or more times) pregnant women (irrespective of age, parity and gestational age) wherein the women were made to undergo antibody screening and antibody identification test after taking written informed consent. Three-cell antibody screening was performed using antihuman globulin gel cards (ID-Card LISS/Coombs) and three-cell panel (ID-DiaCell I, II, III). Those with positive antibody screening were analyzed further for antibody identification test using eleven cell panel (Set ID-Dia Panel). +

ELIGIBILITY CRITERIA

Inclusion Criteria:

1. All the pregnant women who have receive transfusions of more than 05 units of blood and or other blood products were included in the study.

Exclusion Criteria:

1. Diagnosed cases of known antibodies against RBCsantigen.
2. Women who had received anti Dprophylaxis.
3. Women with known autoimmune diseases [such as Systemic lupus erythematosus (SLE), Rheumatoid Arthritis (RA)] were excluded from the study.

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RESULTS

Brief demographics of the study population are tabulated below.

QUANTITATIVE VARIABLES	MEAN ± SD
AGE	*27.16 ± 2.559*
PARITY	*3.08 ± 1.433*
TRANSFUSION	*5.75 ± 1.486*

The frequency of alloantibodies in pregnant women in this study was 12.5%, with 6 red cell antibodies being detected.

RH TYPE	D CELL ABS POSITIVE		ED CELL ABS NEGATIVE		TOTAL	PERCENTAGE	P Value
	n	%	n	%			
RH +VE	*04*	*8.16%*	*45*	*91.83%*	*49*	*87.5%*	*0.021*
RH - VE	*02*	*28.57%*	*05*	*71.42%*	*7*	*12.5%*	*0.132*

The incidence of non-anti-Dwas(66.66%) in all pregnant females.The non-anti-Antibodies included anti-k (33.33%), anti-E (16.66%), anti c (16.66). The incidence of anti-D was 33.33%in D negative blood type.

ANTIBODY	FREQUENCY (n=06)	PERCENTAGE (%)
ANTI-D	*2*	*33.33*
ANTI-c	*1*	*16.66*
ANTI-E	*1*	*16.66*
ANTI-K.S	*2*	*33.33*

Antibody type	Sub type	Frequency (n)	Percentage (%)	Total
RH	ANTI-D ANTI-C ANTI-E	*02* *01* *01*	*33.33* *16.66* *16.66*	*66.66%*
KELL	ANTI-k	*02*	*16.66*	*33.33%*

DISCUSSION

The present study showed rate of Alloimmunization to be 12.5%. This is rather high when compared to published evidence such as Kampalaetal, where an incidence of 5.5% was reported. **[78]** Reported incidence of Alloimmunization from Iran (4.5%), Nigeria (3.4%)[79], Mexico (10.2%) and India (3.3%) too is much lower. [80]The difference in prevalence in our study compared to other

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studies may be due to several aspects, which are small sample size, all information obtained from one hospital mainly a tertiary hospital which receives high-risk population like those having complicated obstetric history.

In the current study,a total of six samples presented occurrence of allo antibodies, antibody specificity two for anti-K, two for anti-D, one for anti-E, and one for anti-c.Rhesus group consisted of majority of all o antibodies with 66.66% followed by kell blood group with 33.33% , which showed similar results, i.e. Khalid et al. (47.06%), Bilwani et al. (38.85%), and Roopam et al (80%).[(80)].

Reviewing the history of fifty six(56) pregnant women we found that 83.9% were multiparous while 16.01% were primary gravida and this was comparable to the result from Saudi Arabia by Bondagi et all.[83]

The prevalence of Rh-positive pregnant women in this study is similar to one in Saudi Arabia by Bondaji with a prevalence of 66.66% also Nigerian study shows moderately greater alloimmunization rate of Rh positive when smatched to Rh negative phenotype

Predominant blood group in our study is O +ve followed by B+ve and then A+ve ,O_ve contribute 7.14%. Similar results were report from Saudi Arabia indicating that blood group O+ve was most prevalent.[88]

In our study,we establish a statistically significant association between incidence of alloimmunisation and bad obstetric history ($p<0.046$),women having an adverse obstetric history were more than 10 times higher than women who were antibody negative. The gravida status of women also showed a statistically important($p<0.039$), positive relationship with alloantibody formation.

There are limited published Data, particularly from India and South East Asia, on such correlations[81.95,,97]

Pakistan have deficient in these accessibilities of appropriate antenatal antibody screening strategies. Our study can be meaningful by signifying that irregular antibody screening of every pregnant woman is not required but it should be restricted to those females with Rh negative phenotype and those who need repeated transfusion and those having bad obstetric history.

History of previous miscarriage has direct effects on the rate of alloimmunization either directly due to fetomaternal or indirectly by increasing the requirement of blood transfusion after miscarriage.

CONCLUSION

After careful consideration, it can be concluded that Alloimunization is sufficiently common (with the incidence of non-anti-D Alloatibodied being particularly high) among multi-transfused pregnant women to recommend screening of maternal serum alloantibodies against red cells in D positive women (with previous unexplained fetal loss), in the early trimester of pregnancy (in conjunction with doppler studies) so that timely treatment strategies may be employed wherever necessary.

Antenatal antibody screening should be recommended in pregnat women especially having significant obstetric history, multiple transfusions and negative Rh phenotype and it could be done in first and third trimester of pregnancy.

CONFLICT OF INTEREST

The authors declare that there is no conflict of onterest in the preparation of this manuscript

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