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RED BLOOD CELL ANTIBODIES AND ADVERSE TRANSFUSION REACTION IN MULTI TRANSFUSED PATIENTS WITH SICKLE CELL DISEASE IN GHANA

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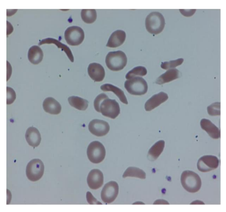
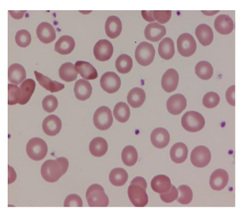
1.INTRODUCTION

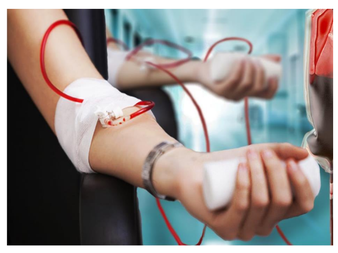
Transfusion therapy is vital in the management of patients with sickle cell disease (SCD). Alloantibody formation against red blood cell (RBC) antigens is a common complication of transfusion therapy. Despite the potential complications of all immunization, RBC antibody tests to detect clinically significant antibodies and provide appropriate intervention is not part of the pre-transfusion screening protocol for patients with SCD in most countries in SSA.



Pre-transfusion



Post-transfusion



2.AIM

We therefore determined the prevalence and specificities of and risk factors for RBC antibodies and for adverse reactions to transfusions in multi-transfused patients with SCD in Ghana.

3.METHOD

A cross-sectional study was performed, involving SCD patients who had received at least two previous RBC transfusion. Participants' basic data on demography, transfusions, adverse reaction to transfusion, and medical history were recorded. Serum samples were screened and typed for RBC antibodies using column gel technique at Sanquin, The Netherlands. Molecular characterization of the Rh D gene was also performed for patients who made anti D.

4.RESULTS

Table 1. Characteristics of 226 multi-transfused Ghanaian patients with sickle cell disease

Characteristic	All patients	Women (n=126)	Men (n=100)	p-value*
Age at inclusion (years)	16.7 (2.0-65.5)	20.9 (2.3-65.5)	14.5 (2.0-54.1)	<0.001
Age at first transfusion (years)†	5 (0.1-61)	7 (0.1-61)	3 (0.1-31)	<0.001
Less than 3, 2 and 1 years (%)	35, 22, 8	32, 18, 10	38, 27, 7	>0.08
Number of transfused units	3 (2-40)	3 (2-40)	3 (2-30)	0.70
Number of transfusion episodes	3 (1-21)	3 (1-21)	3 (1-19)	0.40
Period since first transfusion (years)†‡	8.6 (0-55.5)	7.8 (0-55.5)	9.7 (0-34.8)	0.32
Period since last transfusion (years) ‡	2.0 (0-55.5)	2.2 (0-55.5)	1.8 (0-31.8)	0.37
Years between first and last transfusion†	4 (0-34)	2.8 (0-28)	5.0 (0-34)	0.061
Multiple transfusion hospitals, n (%) §	56 (30)	23 (23)	33 (39)	0.014
RBC antibodies present, n (%)	25 (11)	11 (8.7)	14 (14.0)	0.21

Table 2. Antibody specificities of the 27 RBC alloantibodies identified in the 25 multi transfused patients with SCD patients

Blood group system	Antibody specificities (n)	% of all antibodies
Rhesus	E (10); D (7); G (2); e (1)	37; 26; 7; 4
Kell	K (1)	4
MNS	s (1)	4
Other	Le^a (1); Pan-reactive (3); unidentified (1)	4; 11; 4

Table 3. Univariable analyses of risk factors associated with the presence of RBC antibodies and adverse reactions after transfusion in 226 multi-transfused patients with SCD.

	RBC antibodies		Adverse reactions	
Variable	OR (95% CI)	p-value	OR (95% CI)	p-value
Sex (female is reference)	1.70 (0.74-3.93)	0.21	0.85 (0.48-1.51)	0.58
Age at inclusion	1.16 (0.83-1.62)	0.39	1.08 (0.85-1.36)	0.55
Age at first transfusion (n=174)	1.30 (0.84-1.99)	0.24	N.A.	
<3 versus ≥3 years	0.46 (0.15-1.45)	0.18	N.A.	
<2 versus ≥2 years	0.62 (0.17-2.25)	0.47	N.A.	
<1 versus ≥1 year	0.61 (0.08-4.92)	0.64	N.A.	
Number of transfused units	1.56 (1.03-2.36)	0.036	2.03 (1.48-2.80)	<0.001
Period since first transfusion (n=174)	1.20 (0.74-1.95)	0.46	N.A.	
Period since last transfusion	0.80 (0.58-1.09)	0.16	0.83 (0.67-1.03)	0.09
Pregnancy	1.27 (0.48-3.39)	0.63	N.A.	
Presence of RBC antibodies	N.A.		1.12 (0.46-2.73)	0.81

Molecular *RHD* characterization of the seven patients with anti D revealed that five patients had only *RHD*-null alleles (three *RHD*01N.01/RHD*01N.01*, and one patient each *RHD*01N.01/RHD*01N.03* and *RHD*01N.08/RHD*01N.08* genotype)

Two patients had *RHD* variants (*RHD*03.04/RHD*01N.03* and *RHD*03.04/RHD*38* genotype) associated with D+ serology.00

5.CONCLUSIONS

- The prevalence of RBC alloimmunisation in transfused SCD patients in Ghana was 11.1% and these antibodies were mainly directed to the rhesus antigens
- Sixty-seven (30%) patients experienced various forms of adverse reaction during or shortly after of which 6% were suspected hemolytic transfusion reaction
- RBC antibodies and adverse reaction to transfusion were associated with the number of transfusions
- Given the high immunization rate together with the high frequency of adverse transfusion reactions, pre-transfusion screening for RBC antibodies should become routine practice for patients with SCD.

6.REFERENCES

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