Characteristics of Sickle Cell Disease Recipients and Blood Donors, and Exploratory Associations With Previous Transfusion Reactions, at KWASUTH, Ilorin: A Cross-Sectional Study

Kareem MA[1,2], Oyeniyi GM[1,2], Muhibi MA[3], Ademosun AA[4], Olatubosun LO[5], Olalere FD[5], Kareem YA[6]

[1]Department of Medical Laboratory Science, Faculty of Basic Clinical Sciences, University of Ilorin, Kwara State, Nigeria; [2]Department of Medical Laboratory Science, University of Medical Sciences, Ondo State, Nigeria; [3]Department of Medical Laboratory Science, Federal University of Medical Sciences, Ila-Orogun, Osun State, Nigeria; [4]Department of Haematology and Blood Transfusion, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Osun State, Nigeria; [5]Department of Haematology and Blood Transfusion, University of Ilorin Teaching Hospital, Ilorin, Nigeria; [6]Department of Clinical Services, Neuropsychiatric Hospital, Aro, Abeokuta, Ogun State, Nigeria

Corresponding author:

Mutiat Aina Kareem. Department of Medical Laboratory Science, Faculty of Basic Clinical Sciences, University of Ilorin, Kwara State, Nigeria.

Email: kareemmutiataina@gmail.com | Telephone: +234 813 915 0744

Abstract

Background: Red-cell transfusion is an important component of sickle cell disease (SCD) care but may be complicated by alloimmunisation and transfusion reactions. Local data on recipient transfusion history and donor characteristics can inform service planning.

Objective: To describe SCD recipients and blood donors attending Kwara State University Teaching Hospital (KWASUTH), Ilorin, and to explore associations between previous transfusion exposure and self-reported previous transfusion reactions.

Methods: A cross-sectional study included 50 SCD recipients and 50 blood donors. Sociodemographic and transfusion/donation histories were collected using structured questionnaires. The supplied manuscript also described laboratory testing, but laboratory results were not available for this revision. Descriptive statistics were reported. A univariable logistic regression relating previous transfusion exposure to a history of transfusion reaction was supplied and is presented as exploratory pending verification.

Results: Recipients had a mean age of 7.6 years (SD 4.3); 30 (60.0%) were female and 30 (60.0%) had reportedly received at least two previous transfusions. Eight recipients (16.0%) reported a previous transfusion reaction. Donors had a mean age of 32.1 years (SD 9.1); 32 (64.0%) were male and 26 (52.0%) were self-employed. The supplied univariable model reported an odds ratio of 1.80 (95% CI 1.03-3.16; p=0.039) per unit increase in the variable labelled “blood transfusion”; the exact coding and validity of this analysis require confirmation.

Conclusion: The descriptive data indicate repeated transfusion exposure among paediatric SCD recipients and a reported history of transfusion reaction in a minority. No conclusion about molecular typing or laboratory predictors can be drawn from the supplied results. A corrected analysis and complete laboratory dataset are required before publication.

Keywords: sickle cell disease, red-cell transfusion, transfusion reaction, blood donors, alloimmunisation, Nigeria

Introduction

Sickle cell disease is an inherited haemoglobin disorder associated with haemolytic anaemia, vaso-occlusion, infection risk and organ complications. Transfusion is used for selected acute and chronic indications, including severe anaemia, acute chest syndrome and stroke prevention [1,2]. It can be lifesaving, but repeated exposure to donor red-cell antigens increases the risk of alloimmunisation, delayed haemolytic transfusion reactions and difficulty sourcing compatible units [2-4].

Current transfusion guidance recommends extended red-cell antigen profiling early in care and prophylactic matching for clinically important antigens. Genotyping can improve antigen prediction when recent transfusion makes serological phenotyping unreliable, but it requires validated laboratory methods, quality systems and an implementation strategy [2]. A study can evaluate these benefits only if molecular and serological tests are both performed and reported.

The supplied study enrolled SCD recipients and blood donors at KWASUTH. Because no molecular-genotyping or laboratory results were reported, the present revision addresses the defensible descriptive objective: to characterise participants and explore the

relationship between previous transfusion exposure and reported transfusion reactions.

Methods

Design and setting

A cross-sectional study was conducted at the sickle cell clinic and blood bank of KWASUTH, Ilorin, Nigeria.

Participants

The participants were 50 people with SCD and 50 blood donors. Recipients were confirmed to have received transfusion and donors were free of transfusion-transmissible infections. All the participants gave informed consent to participate in the study. In addition, participants who were less than 18 year-old also gave assent to participate in the study. Caregivers assisted with questionnaire completion for children. The relationship, if any, between individual donors and recipients was not stated.

Sample size

Data collection and laboratory procedures

A structured interviewer-assisted questionnaire collected sociodemographic, clinical, transfusion and donation information. The manuscript described immunochromatographic TTI screening with ELISA confirmation, cellulose-acetate haemoglobin electrophoresis, antihuman-globulin testing and major crossmatching. Manufacturers, control procedures, antibody-identification methods and laboratory findings were not supplied. These methods cannot be evaluated or linked to outcomes until the missing information is provided.

Statistical analysis

Descriptive results were presented as means, standard deviations, frequencies, percentages and exploratory estimates.

Ethics

Ethical approval was obtained from the Kwara State Ministry of Health Ethical Review Committee (ERC/MOH/2024/02/189). Informed consent was received from all adult participants and from the caregivers of paediatric recipients. In addition, paediatric participants also gave age-appropriate assent to participate in the study.

Results

Recipient characteristics

The mean recipient age was 7.6 years (SD 4.3) and mean body weight was 23.6 kg (SD 8.2). Thirty recipients (60.0%) were female. The supplied narrative reported that 30 (60.0%) had received at least two previous transfusions and eight (16.0%) had experienced a previous reaction, described as mostly mild. The categories and clinical verification of reactions were not supplied.

Donor characteristics

The mean donor age was 32.1 years (SD 9.1) and mean body weight was 60.8 kg (SD 6.6). Thirty-two donors (64.0%) were male. The supplied narrative stated that 14 (28.0%) were first-time donors and 16 (32.0%) had last donated four to six months earlier; complete donation-frequency categories were not supplied.

The baseline transfusion and donation histories of the cohort revealed clinically relevant patterns. A substantial majority of patients (n=30, 60%) presented with a history of multiple prior transfusions (≥2 episodes), indicating a heavily transfused population (Figure 1). While the overall prevalence of prior transfusion reactions was low (n=8, 16%), these events were predominantly characterized as mild in severity, suggesting a generally tolerable safety profile in this group (Figure 2). In contrast, the donation history showed a more heterogeneous distribution: the largest

Table 1 Sociodemographic Characteristics of the Recipients (N=50)

Characteristic	n	%
Age		
<5 years	14	28.0
5-9 years	20	40.0
10-14 years	12	24.0
15-19 years	4	8.0
Sex		
Male	20	40.0
Female	30	60.0
Education		
Islamic education	4	8.0
Nursery	20	40.0
Primary	16	32.0
Secondary	10	20.0
Body weight		
10-19 kg	20	40.0
20-29 kg	14	28.0
30-39 kg	16	32.0

subset of participants (n=16, 32%) had donated recently (within 4–6 months), whereas a notable proportion (n=14, 28%) were first-time donors, highlighting a mixed population of experienced and naïve donors (Figure 3).

Table 2 Sociodemographic Characteristics of the Donors (N=50)

Characteristic	n	%
Age		
18-19	2	4.0
20-29	22	44.0
30-39	16	32.0
40-49	8	16.0
50-59	2	4.0
Sex		
Female	18	36.0
Male	32	64.0
Education		
Islamic education	4	8.0
Primary	8	16.0
Secondary	10	20.0
Tertiary	22	44.0
Postgraduate	6	12.0
Unemployed	8	16.0
Self-employed	26	52.0
Employed	16	32.0
Marital status		
Single	20	40.0
Married	24	48.0
Widowed	2	4.0
Divorced	4	8.0
Religion		
Christianity	12	24.0
Islam	38	76.0

Table 3 examines the association between blood transfusion and transfusion reaction. The odds of transfusion reaction following each blood donation is 1.8, implying a two-fold risk of a reaction following transfusion. This relationship is statistically significant (P=0.039).

Exploratory transfusion-reaction analysis

The output suggests higher odds of a reported previous reaction as the predictor increased. The effect cannot be interpreted clinically until the predictor's unit and coding are confirmed. The result does not show that each "blood donation" causes a reaction; donors do not experience recipients' transfusion reactions.

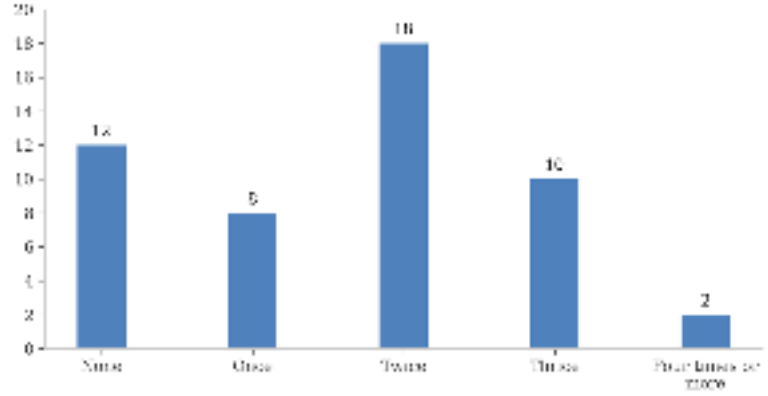

Fig 1. Number of previous blood transfusion

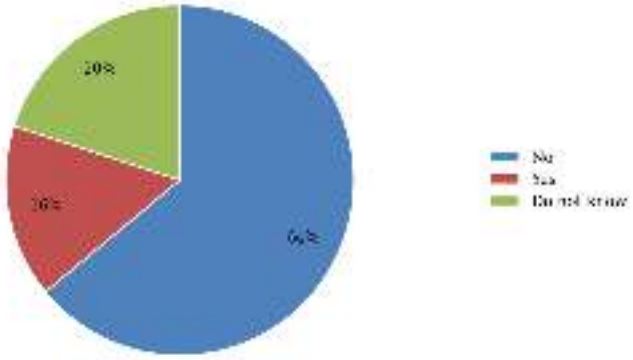

Fig 2. History of Previous Transfusion Reaction

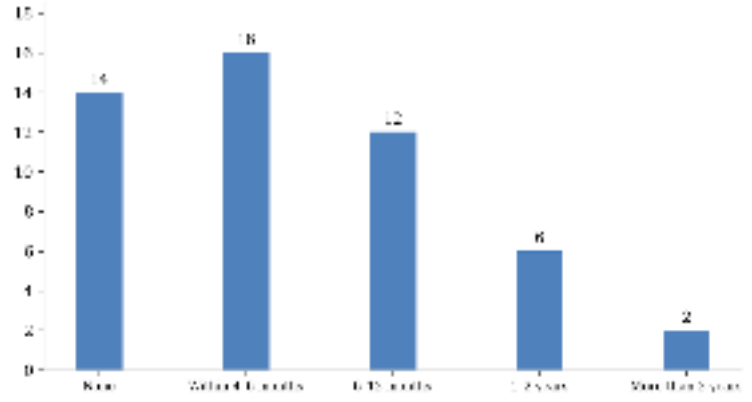

Fig 3. Number of previous blood donation

Table 3: Logistic Regression of Blood Transfusion and Transfusion reaction

Predictor	Odds ratio	SE	z	p value	95% CI
Variable labelled "blood transfusion"	1.805	0.516	2.07	0.039	1.031-3.161
Constant	0.207	0.123	-2.62	0.009	0.060-0.666

Table 4: Multiple Linear Regression of Age, Education and Blood transfusion

Predictor	Coefficient	SE	t	p value	95% CI
Age	0.011	0.021	0.50	0.620	-0.032 to 0.054
Islamic education	-0.926	0.640	-1.45	0.155	-2.215 to 0.364
Primary education	-1.423	0.697	-2.04	0.047	-2.829 to -0.018
Secondary education	-0.112	0.570	-0.20	0.845	-1.260 to 1.036
Tertiary education	-1.035	0.660	-1.57	0.124	-2.365 to 0.294
Constant	1.779	0.625	1.63	0.111	-.376 to 3.547

The model was reported as $F(5,44)=3.38$, $p=0.0113$ and R^2 approximately 0.196. This indicates that the overall model was statistically significant under the supplied output, contrary to the original narrative. However, the outcome's definition and distribution, reference category and appropriateness of linear regression remain unclear. No substantive conclusion should be based on this table until the analysis is re-run and independently checked.

Discussion

The recipients were predominantly children, and 60% were reported to have received at least two previous transfusions. Repeated transfusion is clinically relevant because exposure to donor antigens can increase alloimmunisation and complicate future compatibility [2-4]. The reported 16% history of reaction requires cautious interpretation because reaction type, timing, severity and verification were not described.

The exploratory odds ratio may indicate a relationship between cumulative transfusion exposure and previous reactions, but the small number of events and unclear predictor coding limit inference. The analysis should not be described as a two-fold risk "following each blood donation". A recipient receives a transfusion; a donor makes a donation. Causal interpretation is not possible in this cross-sectional design.

Extended antigen profiling and prophylactic Rh and Kell matching are supported by current SCD transfusion guidance, while genotyping may be preferred when recent transfusion makes serological phenotype inaccurate [2]. These recommendations arise from external evidence, not from a molecular comparison in this dataset. Any local implementation proposal should assess equipment, reagents, staff competency, quality assurance, turnaround time, unit availability and cost.

The donor findings are descriptive. An apparent association between education category and a poorly defined donation outcome cannot establish that primary education reduces willingness to donate. Donor recruitment should follow evidence-based, voluntary and non-remunerated approaches with accurate public education and donor safety [5,6].

Strengths and limitations

The study provides local descriptive information about SCD recipients and blood donors. Major limitations include the single-centre design, small sample, unclear linkage of donor-recipient pairs, historical self-report of reactions, missing laboratory results, incomplete sample-size reporting and unverified statistical models. Only eight participants reported a reaction, limiting model stability. The absence of molecular testing prevents any comparison between genotyping and serology.

Conclusion

Repeated transfusion exposure was common among the paediatric SCD recipients, and a minority reported previous transfusion reactions. These observations support careful transfusion history, antibody investigation and guideline-based antigen

profiling. The supplied evidence does not establish laboratory predictors, molecular superiority or the causes of donor behaviour. Complete data and corrected analyses are required before publication.

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