

Distribution of Rhesus and Kell blood group frequencies in the Mauritanian population

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Dear Sir,

Many blood group systems, such as ABO, Rhesus, Kell, Duffy, MNS, Lewis and Kidd, have been reported so far in humans¹. The Rhesus (Rh) blood system consists of 45 defined antigens of which five (D, C, c, E and e) are the cause of the second most important adverse effects, after those due to ABO, when group incompatibility occurs in blood transfusion. Their function in evolution, genetic disease and forensic medicine is being intensively investigated. The D, C, c, E and e antigens are determined by two adjacent genes i.e. *RHD* and *RHCE* encoding for RhD and RhCE proteins, respectively². The Kell system, discovered in 1946, is the third most potent system at triggering haemolytic transfusion reactions and consists of 25 highly immunogenic antigens, all of which are peptides within the Kell protein encoded by the *KEL* gene².

Both Rhesus and Kell group systems show considerable genetic variation between populations across the world³. However, despite the vital importance of their determination in blood transfusions and organ transplantation, most of the data published worldwide deals with the ABO system. In Mauritania, where typing the ABO system and Rh(D) to ensure compatibility between donor and recipient is a pre-requisite before blood transfusion, Rhesus (C, E, c, e) and Kell antigens are often not tested for and as a result no data on their prevalence and ethnic distribution in our population are currently available.

This study, the first conducted in our country on these blood groups, was aimed to evaluate their prevalence and ethnic distribution in the Mauritanian population. Global frequencies and ethnic distribution of Rhesus (D, C, E, c, e) and Kell antigens were computed from data collected from 2,094 and 904 volunteers, respectively, who gave blood at the

national blood transfusion centre in Nouakchott, the capital city. A filing system was set up to ensure that the data from each donor were counted once only and to exclude foreign nationals.

Serotyping was carried out in micro-titration plates by a standard haemagglutination test using commercial anti-D, anti-C, anti-c, anti-E, anti-e and anti-K monoclonal antibodies. Appropriate positive and negative controls were also included. All samples that showed negative agglutination with anti-D were confirmed using Coomb's test.

Allele frequencies were calculated using the method of Fisher and phenotype ethnic variation was analysed using the chi-square test with the level of statistical set at a p-value of 5%. The findings were compared to those obtained in North Africa and the sub-Saharan populations of similar ethnic backgrounds live.

Among a total of 2,094 Mauritanian blood donors screened, the antigen frequencies of D, C, c, E and e were 93.55%, 42.69%, 94.03%, 13.95% and 98.19%, respectively. The order of prevalence of the allele frequencies calculated in the general population (Table I) was: $R^0(Dce) > r(dce) > R^1(DCe) > R^2(DcE) > r'(dCe) > r''(dcE)$. Although this pattern was globally the same in the three main ethnic groups i.e. the white and black Moors and the black Africans, significant ethnic variation was observed ($p = 0.004$). Furthermore, the frequencies found in white Moors and black Africans were closer to those reported for North African⁴ and sub-Saharan populations, respectively⁵. The prevalence in black Moors was intermediate between the values in the two other ethnic groups.

One likely explanation of this result lies in the ethnic composition of our population. The Mauritanian population comprises two racial categories: the Moors (Maures) of Arab-Berber origin composed

Table I - Ethnic distribution (%) of Rhesus haplotypes and Kell phenotype in the Mauritanian population.

Rhesus haplotype	Frequency		
	WM	BM	BA
R ⁰ (Dce)	31.78	53.94	62.56
r (dce)	27.16	21.61	16.24
R ¹ (DCe)	28.55	16.7	13.26
R ² (DcE)	10.69	4.44	7.94
r ¹ (dCe)	1.64	2.30	0
r ⁰ (dcE)	0.18	1.01	0
R ^z (DCE)	0	0	0
Kell phenotype			
Kell positive	2.96	1.25	0
Kell negative	97.04	98.75	100

Legend

WM: whites Moors; BM: black Moors; BA: black Africans.

of white and black Moors both speaking Hassaniya, a Berber-influenced Arabic dialect. This group has historically been identified with the populations of North Africa through a common heritage (language, culture and religion). The second racial category is the Mauritanian black African group which consists of three ethnic entities (Pulars, Sonikes and Wolofs) all from the same black African descent but each with its own language and cultural specificities.

Although the Moors and Mauritanian black Africans are racially different they share the same Islam religion and have lived together for centuries. This cohabitation has led not only to cultural exchange but also interracial marriages which have contributed greatly to shaping a genetically mixed society. Thus, Rhesus frequencies in black Moors are understandably intermediate between those in the white Moors and Mauritanian black Africans. Furthermore, the presence of Kell group antigens in the black Moors could only be a result of interracial mixing especially for the Kell positive phenotype, which was not identified in the Mauritanian black African group.

This study has provided the first data on the prevalence and ethnic distribution of Rhesus and Kell antigens in the Mauritanian population. Although there are similarities with the prevalence patterns in North African and sub-Saharan populations, there are also differences in the frequencies, in support of the multi-ethnic background of our population.

This information may be useful to health authorities when deciding on the preventive measures to reduce blood group incompatibility reactions in blood transfusions.

The Authors declare no conflicts of interest.

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