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Distribution of Kell Blood Group System Antigens Kp^a , Kp^b in Major Tribes of Turaba Province-KSA

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Abstract

Background. *Kell blood group system is the one of the most minor blood group system has clinical significant in blood transfusion and cause hemolytic disease of the new born (HDN). Kell blood group system was discovered by Coomb's, Mourant, and Race in 1946 from child of Mrs. Kellecher who was suffering from HDN, and the antibody coated red blood cell of the newborn gave positive direct coomb's test.*

Study design*. This study desgined to determine the distribution of two antigens of Kell blood group system Kp^a , Kp^b, in the major populations of Turaba province, Saudi Arabia. The study was carried out in different parts of the Turaba province in the period between July and December 2007, after taking consent from the health authority.*

Materials and methods*. Three hundred ninety nine venous blood samples were collected into EDTA containers from unrelated individuals of major tribes in turaba province. The Kell Blood group antigens were detected using gel immune-diffusion system.*

Results. *Results showed that the frequency of Kp^a in the major population of Turaba province was 99%, where the frequency of Kp^b was 2%.Also result proved that the most frequent phenotype in Turaba province population was Kp (a-b+) with frequency of 92%.*

Conclusion. *This study proved that the Kell blood group antigen Kp^b, was the commonest antigen in Turaba province population, while the Kp^a was the lowest. Only one sample was recorded as Kell null (K_0) .*

Keywords: *Kp^a, Kp^b , immunodiffusion gel Technique, Turabah province.*

1. Introduction

Red blood group antigens include various cellular and soluble components of whole blood that interact with specific antibodies, Red blood cells phenotype can be achieved using antibodies and reagents of known specificities1. Blood groups have been the subject of research because of the importance of blood transfusion in surgery and other haemorrhagic catastrophies (Brown, 1992). It is sometimes thought that a worker in transfusion medicine is merely a provider of safe blood if and when the clinician requests it. Indeed, in many ways this is true and a great deal of effort and thought goes into the blood transfusion service. However, blood groups and immunohaematological problems of blood transfusion are extremely interesting in their own right and their solutions have much to offer to haematology in general (Hoffbrand & Pettit, 2001). Forensic application of blood group studies is of great value in detection of crime and determination of paternity (Jolly, 2002).

The antigens of Kell blood group system were named 1946 from child of Mrs. Kellecher who was suffering from HDN, and the antibody coated red blood cell of the newborn gave positive direct coomb's test1. , Allen and Rosenfield proposed a numerical nomenclature. The antigens of Kell blood group system are listed in table 1 together with their numerical equivalents and antigen frequency (Lee. S et al., 1995) discovery of anti-Kel 1 (anti-KI) in 1945 was an early bonus that fo11owed developmentand application of the antiglobulin test1.

Table 1: Antigens of Kell blood group

No	Kell antigens	Numerical Term	Antigen frequency %
1	KELL	K1	9.0
2	K(Cellano)	K2	99.9
3.	Kp^a (Penny)	K3	2.0
4.	Kp^b(Rautenberg)	K4	99.9≥
5.	Ku(Peltz-Tatal Kell)	K5	99.9≥
6.	Js^a(Sutter)	K6	1.0 in whites≤
7.	Js^b(Mathew)	K7	19.5 in blacks
8.	KL(Claas)	K9	99.9≥
9.	UI^a	K10	2.6 . in Finns
10.	Cote′	K11	1.0 in others≤

11.	Bockman	K12	99.9≥
12.	Sgro	K13	99.9≥
13.	Sonitini	K14	99.9≥
14.	k-like	K16	99.9≥
15.	Wk(Weeks)	K17	99.8
16.	Marshal	K18	**0.3**
17.	Sublett	K19	99.9≥
18.	km	K20	99.9≥
19.	Kp^c(Levay)	K21	99.9≥
20.	IKar	K22	0.1≤
21.	Not designed	K23	99.9≥
22.	CIs	K24	2.0≤

The first antibody was found in a maternal serum and caused hemolytic disease of the newborn in her infant. The Ke11 (K1) antigen is of high immunogenicity and innumerable examples of the antibody have been found.Anti-KI reacts with about 9% of individuals in white populations. As with many red cell blood groups, Ke11 has increased greatly in its recognized complexity, and now includes 11 probable subloci and 23 discrete antigens. The Kell gene is inherited as an autosomal codominant characteristic but the locus has not been mapped.

Table 2: Some phenotypes of Kell blood group system

Kell phenotype	Black	Whites
Kp (a+b-)	< 0.1	< 0.1
Kp (a-b+)	98.0	99.9
Kp (a+b+)	2.0	< 0.1

Materials and Methods

Three hundred ninety nine venous blood samples were collected from unrelated individuals people belonging to the major ethnic populations of Turaba province, from both gender. Sample size was calculated using the approximate proportion to population size in Turaba province. The study was done in over six months. Each participant , who accepted to participate in the study, received three sheets,(consent form, venipuncture form and questionnaire). Kp^a, and Kp^b antigens were detected in blood samples using immunodiffusion gel System (ID-Gel System).

Immunodiffusion Gel System (ID-Gel System) Reagents

• ID-Cards"Anti-K" with 6 microtubes containing anti-K of human origin within the gel matrix .Preservatives < 0.1%NaN_3.
• ID-Cards"Anti-k" with 6 microtubes containing anti-k of human origin within the gel matrix .Preservatives < 0.1%NaN_3.
• ID-Cards"Anti-Kp^a" with 6 microtubes containing anti-Kp^a of human origin within the gel matrix .Preservatives < 0.1%NaN_3.
• ID-Cards"Anti-Kp^b" with 6 microtubes containing anti-Kp^b of human origin within the gel matrix .Preservatives < 0.1%NaN_3.
• ID.Test sera, of human origin, freeze-dried, in 0.5 vials.
•ID-Cards"LISS"/Coombs"with6 microtubes containing polyspesefic anti-human globulin, within the gel matrix.

Procedure

5% of red blood cell suspension was prepared by dispensed of 0.5 ml of ID-Diluent 1 into clean test tube.
50 µL of whole blood or 25 µL of packed red cells was added to the same test tube, and mixed gently. Test tube was incubated for 10 minutes at room temperature. (18-25 C^o). The microtubes of the ID.Cards were identified with the donor's name and/or number, and the aluminum foils were removed from as many microtubes as needed.10 µL or 12 µL of the red cell suspension was added to the appropriated microtubes(one for K1, and other for K2. ID.Cards were centrifuged for 10 minutes in the ID.Centifuge.

Results

Table 3: Frequency of participants according to gender

Sex	Number of participant	%
Male	217	54
Female	182	46
Total	399	100

Table 4: Frequency of Kell Blood Group Antigens Kp^a, Kp^b among Turaba population

Sex	Kp^a	Kp^b	Null
Male	18	198	1
Female	13	169	0
Total	31	367	0
%	7.8	92	0.2

Table 5: Degree of reaction strength among positive Kp^b participants

Sex	+ 1	+ 2	+ 3	+4
Male	11	45	142	18
Female	5	48	118	11
Total	16	93	260	29

Tables 6: Frequency of Kell blood group phenotypes among Turaba Tribes

Sex	Kp (a+b+) %	Kp (a-b+) %	Kp (a+b-) %	Kell null%
Male	8.3	91.2	0	0.2
Female	7.1	92.9	0	0

Discussion

In this study results showed that the frequency of Kp^a in the major population of Turaba province was 99%, where the frequency of Kp^b was 2%. Also results proved that the most frequent phenotype in Turaba province population was Kp (a-b+) , when the lowest phenotype was Kp (a+b-).These results agreed with another populations throughout the world. Kell blood group antigen Kp^b was most frequent, but the antigen Kp^a was the lowest. These results found to be closed to the results of study done in Sudan by Tariq.E.Elmissbah [(1)]. In compared with American population the frequencies of Kp^a , and Kp^b antigens were in agreement with their frequencies in white and black American[(5)]. Kp (a-b+) Kp (a+b-), phenotypes were recorded in Turaba province in frequencies similar to white and black American[(5)]. In this study only one sample was recorded as Kell null.

Conclusion

1. Kell blood group antigen Kp^b was the commonest antigen in e population of Turaba province, while the Kp^a antigen was the least frequent.
2- Kp (a-b+) phenotype was the most common phenotype of Kell blood group system in Turaba population while Kp (a+b-) phenotype was the least frequent.
3.Kell null (K_0) was not recorded in all participants.
4-There are no significant differences between the frequencies of Kell blood group antigens, and phenotypes, in Turaba population and other populations throughout the world.

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