

A PRELIMINARY STUDY OF THE DISTRIBUTION OF BLOOD GROUP SYSTEMS IN THAI BLOOD DONORS DETERMINED BY THE GEL TEST

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Abstract. Two hundred blood samples obtained from volunteer blood donors at the Blood Bank, Army Institute of Pathology were studied for red cell groupings in the ABO, Rh, MNSs, Duffy, Lewis, P, Kell, Lutheran and Kidd Systems. Each sample was tested by the gel test using five cards; the ABO-Rh card, Diaclon Rh sub groups + K card, Antigen profile I card (P, Le^a, Le^b, Lu^a, Lu^b), Antigen profile II card (k, Kp^a, Kp^b, Jk^a, Jk^b) and Antigen profile III card (M, N, S, s, Fy^a, Fy^b). For the ABO System, group O is the most common (40.5%) followed by group B (30.5%), group A (20.5%) and group AB (8.5%). The most common Rh gene complex was CCDee (51.5%), which was similar to other studies. The incidence of MMss and MNss gene complexes were the most common in the MNSs System. Fy^a is very common as in other Asians. In the Lewis System, the incidence of Le (a-b-) was 23.5%, which is consistent with other findings in the Thai population. Sixty (30%) were positive with anti-P₁. For the Kell System, only kk and Kp^b positive types were observed in this study, as well as Lu (a-b+) in the Lutheran System. Jk (a-b-) was not found, which is considered a rare phenotype among Thai people. This study reveals the blood group distribution in 200 Thai volunteers using the gel test. Because of its simplicity and efficacy, this test is practical in population studies. Moreover, it is useful for mass screening and application in emergency situations.

INTRODUCTION

Safe and effective red cell transfusion providing compatible blood in ABO and Rh blood group systems is given to patients as a routine practice. It is further recommended that the antibody screening test be performed together with the crossmatching of donor red cells in all pretransfusion testing. If the antibody screening is positive, more time is needed to identify irregular antibodies and to select the appropriate antigen negative units. (American Association of Blood Banks, 1999).

In Thailand, the prevalence of thalassemia and hemoglobinopathy is high. Most of these patients require repeated blood transfusion in

order to maintain their normal activity (Wasi *et al*, 1980). Although all patients receive group and type-specific red cells that are compatible, there is an increase in the incidence of red cell alloantibodies and an autocontrol positive responses in these patients (Srijinda *et al*, 1996). For such cases, the rapid availability of fully-typed donor blood is of great advantage. However, only limited blood group antigen typing has been carried out because with conventional procedures, complete phenotyping is time consuming, cumbersome and expensive. In general, when a certain antigen unit is requested, selected donor blood is then tested for its particular antigens. Since the introduction of the gel test in 1988, numerous studies about this technology have shown a favorable comparison to the conventional tube test for its higher safety, efficacy and efficiency in ABO and Rh grouping, phenotyping, antibody detection, crossmatching and direct an-

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tiglobulin testing (Lapierre *et al*, 1990; Bromilow, 1993; Nathalang *et al*, 1997). This study was undertaken to examine the ABO, Rh, MNSs, Duffy, Lewis, P, Kell, Lutheran, and Kidd blood groups in Thai blood donors by the gel test and to provide more data of typed blood donors.

by the manufacturer (DiaMed, Cressier sur Morat, Switzerland).

Statistical analysis

The distribution of blood group systems was compared with other studies in the Thai population by chi-square test (Ingelfinger *et al*, 1994).

MATERIALS AND METHODS

RESULTS

Subjects

Two hundred ACD blood samples were obtained from the donors at the Blood Bank of the Army Institute of Pathology, Bangkok, Thailand. They were 147 males and 53 females, their ages ranging from 17 years to 58 years with the mean age of 34 years.

Two hundred blood samples were tested for red cell grouping by the gel test. For the ABO System; group O is the most common (40.5%) followed by group B (30.5%), group A (20.5%) and group AB (8.5%), (Table 1). For the Rh System, Rh (D) positive was 100% and CCDee was the most common Rh gene complex (51.5%). The ccDee, Ccddee and cc ddee phenotypes were not observed in this study (Table 2). For the MNSs System, MMss and MNss were the most common groups as shown in Table 3. For the Duffy System, the blood groups are presented in Table 4. Only three Fy^a negative phenotypes were found. For the Lewis System, the results of typing with anti- Le^a and anti-Le^b are shown in Table 5, the Le (a-b-) phenotype was 23.50%. For the

Methods

Each sample was tested by the gel test using five cards; the ABO-Rh card, Diaclon Rh sub groups + K card, Antigen profile I card (P, Le^a, Le^b, Lu^a, Lu^b), Antigen profile II card (k, Kp^a, Kp^b, Jk^a, Jk^b) and Antigen profile III card (M, N, S, s, Fy^a, Fy^b). ID diluent 1 (bromelin) and ID diluent 2 (modified LISS) were used for red cell suspension as described

Table 1
ABO blood group distribution in 200 blood donors.

	Year	No.	Blood group (%)			
			O	A	B	AB
Present study	2000	200	40.50	20.50	30.50	8.50
Chandanayingyong <i>et al</i>	1979	8,711	37.65	20.19	35.19	6.97

Table 2
Rh blood group distribution in 200 blood donors.

	Year	No.	Phenotype (%)							
			CCDee	CcDEe	CcDee	ccDEe	ccDEE	CCDEe	CcDEE	ccDee
Present study	2000	200	51.50	30.50	10	2.50	2.50	2	1	0
Chandanayingyong <i>et al</i>	1979	1,000	55.60	26.70	8.70	1.50	3.60	2.60	0.50	0.60

Table 3
MNSs blood group distribution in 200 blood donors.

	Year	No.	Phenotype (%)								
			MM _{SS}	MN _{SS}	NN _{SS}	MNS _S	MMS _S	NNS _S	MMSS	MNSS	NNSS
Present study	2000	200	43.50	32	10.50	6.50	5.50	1.50	0.50	0	0
Chandanayingyong <i>et al</i>	1967	456	35.96	40.35	7.24	7.24	8.11	0.90	0	0	0.20

Table 4
Duffy blood group distribution in 200 blood donors.

	Year	No.	Phenotype (%)			
			Fy(a+b-)	Fy(a+b+)	Fy(a-b+)	Fy(a-b-)
Present study	2000	200	78	20.50	1	0.50
Chandanayingyong <i>et al</i>	1979	1,000	78.90	19.70	1.40	0

Table 5
Lewis System in 200 blood donors.

	Year	No.	Phenotype (%)			
			Le(a+b-)	Le(a+b+)	Le(a-b+)	Le(a-b-)
Present study	2000	200	11	0	65.50	23.50
Chandanayingyong <i>et al</i>	1979	1,668	28.48	0	40.65	30.87

Table 6
Lutheran System in 200 blood donors.

	Year	Number	Phenotype (%)			
			Lu(a+b-)	Lu(a+b+)	Lu(a-b+)	Lu(a-b-)
Present study	2000	200	0	0	100	0
Chandanayingyong <i>et al</i>	1967	455	0	0.22	99.34	0.44

Table 7
Kidd System in 200 blood donors.

	Year	Number	Phenotype (%)			
			Jk(a+b-)	Jk(a+b+)	Jk(a-b+)	Jk(a-b-)
Present study	2000	200	25	45.50	29.50	0
Chandanayingyong <i>et al</i>	1967	456	31.80	42.76	25.44	0

P System, 60 or 30% were positive with anti-P₁. For the Kell System, only kk and Kp^b positive types were observed in this study. For the Lutheran System, only Lu (a-b+) were

observed as shown in Table 6. For the Kidd System, the blood groups are presented in Table 7. The Jk (a- b-) was not observed in this study.

DISCUSSION

The distribution of blood group systems in Thai blood donors using the gel test has been studied. Group O is the most common, followed by group B, which is the usual pattern in Southeast Asia (Chandanayingyong *et al*, 1967). Also, the absence of Rh (D) negative individuals and the high CCDee gene complex are similar to other studies (Phansomboon *et al*, 1949; Chandanayingyong *et al*, 1967). With regard to the MNSs System, the high frequency of M and the low frequencies of N and S show the typical characteristics of the people in Southeast Asia countries (Phansomboon *et al*, 1956; Chandanayingyong *et al*, 1967). Fy^a is very common and Fy (a-b-) is exceedingly rare in Thai people. In the Lewis System, 23.50% were found to be Le (a-b-), which also confirms other findings (Chandanayingyong *et al*, 1967; 1979). P₁ positive (30%), kk and Kp^b positive (100%) were comparable with other studies in the Thai population (Phansomboon, 1957; Chandanayingyong *et al*, 1967). The high frequency of Lu (a-b+) and the absence of Lu (a+b-), Lu (a+b+) and Lu (a-b-) were found among the 200 tested. Jk (a-b-) was not found in this study, which is considered a rare phenotype among Thai people (Chandanayingyong *et al*, 1967).

In conclusion, this study demonstrates the blood group distribution in 200 Thai volunteers using the gel test, which is beneficial in the selection of appropriate red cells for multitransfused patients. Additionally, the test itself is simple and practical in population screening and application in emergency situations.

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