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, Le⁰, Le⁴, Lu⁰, Lu⁴), Antigen profile II card (K, Kp⁰, Kp², Jk⁰, Jk²) and Antigen profile III card (M, N, S, s, Fy⁰, Fy⁴). 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. Fy⁰ 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 Kp² 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 anti-
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.

**MATERIALS AND METHODS**

**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.

**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 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).

**RESULTS**

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 ccddee 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

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<th>Table 1</th>
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<td>Present study</td>
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P System, 60 or 30% were positive with anti-
P_; 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; Chandanayingyong et al., 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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