

The prevalence of GP Mur and anti-"Mi^a" in a tertiary hospital in Peninsula Malaysia

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Abstract

The Mi III phenotype of the Miltenberger subsystem (or GP Mur) is relatively common in South-east Asia especially along the south-east coast lines of China and Taiwan. The term anti-"Mi^a" describes antibodies that react with the Mi III phenotype. Since the Peninsula Malaysian population is a multiethnic one with a significant proportion of Chinese, a study was conducted into the prevalence of anti-"Mi^a" in patients from its 3 major ethnic groups – Chinese, Malays and Indians, as well as the GP Mur phenotype in blood donors (healthy individuals). Blood samples from 33,716 patients (general and antenatal) were screened for anti-"MP" from January 1999 to December 2000. The investigation for the GP Mur phenotype representing the corresponding sensitizing antigen complex was carried out in 655 blood donors.

Serum anti-"Mi^a" antibody was found to be the third most commonly occurring antibody detected in our patients and was found in all the ethnic groups. The antibody was detected in 0.2% of 33,716 antenatal and general patients with a prevalence in Chinese of 0.3%, Malay 0.2% and Indian 0.2%. The detection of these antibodies in the ethnic groups other than the Chinese is a noteworthy finding as such information is not well documented. The GP Mur red cell phenotype was detected in 15/306 (4.9%) of Chinese blood donors, a lower prevalence than in Chinese populations in other countries in the region. More significant was its detection in the Malays (2.8%) and the Indians (3.0%).

Because of the many reports of clinical problems associated with the "Mi^a" antibody including the causation of fetal hydrops and haemolytic transfusion reactions, it is warranted that the GP Mur red cells be included in screening panels for group and screen procedures in countries with a significant Asian population.

Key words: GP Mur phenotype, anti-"Mi^a", ethnic groups, Malaysians

INTRODUCTION

The antigens of the MNS system are now known to be located on two sialoglycoproteins designated as glyophorin A (GYPA) and Glycophorin B (GYPB) embedded in the red blood cell membrane. The Miltenberger (Mi) subsystem represents a group of phenotypes for red cells that carry low frequency antigens associated with the MNSs blood group system. Until recently, nine subclasses (Mi I to Mi IX) were identified, each of which are defined by one or more common antigenic determinants reacting with type specific sera. However, because within this group of phenotypes no identified common determinant was found, Tippet et al proposed a new classification using GP and the name of the first propositus GP Mur to replace the Mi classification. The new classification also allowed easier inclusion of new phenotypes.¹

Significant differences in the frequencies of the GP Mur phenotype and the corresponding alloantibodies are found among human populations from different geographic locations. The prevalence of Miltenberger antibodies directed against antigenic determinants of the GP Mur (Mi III) phenotype (called anti-"Mi^a" in these reports) was found to be 0.28% in Chinese blood donors in Taiwan,² 0.34% in Chinese blood donors in Hong Kong,³ and 0.20% in Thai blood donors.⁴ The prevalence of the GP Mur phenotype in Chinese blood donors in Taiwan was reported to be 7.3%,⁵ and in Hongkong 6.3%.⁶ In Thailand the prevalence was 9.7%.⁴

These anti-"MP" antibodies are known to be clinically significant and have been reported to be associated with hydrops fetalis, mild to moderate haemolytic transfusion reactions, and delayed haemolytic transfusion reactions. A case of hydrops foetalis reported showed that the

maternal anti- "Mi^a" was the most probable cause. The potency in this case was the result of repeated immunisation of the mother during some of her previous pregnancies.'

The reports prompted this study because the Chinese comprise a significant proportion of the Peninsula Malaysian population. It was also decided to determine the prevalence of the GP Mur phenotype and the corresponding antibodies in the two other major ethnic groups of the population i.e the Malays and Indians, as there is scanty documented information for these ethnic groups.

MATERIALS AND METHODS

Between January 1999 to December 2000, 33,716 specimens sent for routine investigation from general and antenatal patients of the University of Malaya Medical Centre were grouped (ABO and D-typed) and screened for antibodies using Commercial 3 cell panel set - Liss/Coombs cards (Diamed). The third vial in the 3-cell panel screening set contained GP Mur (Mi III) phenotype cells. Confirmation of the specificity of "anti- Mi^a" was accomplished by testing the serum with two or more examples of GP Mur (Mi III) positive cells. Those showing a positive reaction were tested against red cell panels for the identification of antibodies using routine techniques.

Because of the limited availability of antibody containing sera, only 655 voluntary blood donors were screened for the GP Mur phenotype using patient derived antisera which had already been confirmed as having only antibodies directed against 2 or more cells of the GP Mur (Mi III) phenotype. Detection of the phenotype was considered important as one needed to know the prevalence of the sensitizing antigen which

can result in the development of the corresponding antibodies. The LIS AHG method was used to identify the presence of the corresponding antigen. As the prevalence of natural anti-"Mi^a" in blood donors is very low (0.06%),⁸ the test for anti-"Mi^a" in blood donors was not carried out in our study.

RESULTS

A total of 33,716 patient specimens which included 10,397 from antenatal patients were grouped and screened for all common antibodies and specifically for anti-"Mi^a" antibodies. 21 (0.2%) of 10,397 antenatal cases and 56 (0.2%) of 23,319 general in-patients were positive for the anti-"Mi^a" antibody. The antibody was detected in 29 Chinese, 30 Malay, 14 Indian and 4 expatriate patients (3 Indonesians, 1 Burmese) (Table 1)

A spectrum of antibodies were found in 2136 of the 33,716 specimens investigated. These specimens were submitted for detailed antibody identification. Single antibodies were found in 812 specimens and multiple antibodies in 405 specimens (Table 2). Non-specific antibodies, auto-antibodies and cold agglutinins were found in 919 specimens. 77 (0.2%) were positive for the anti-"Mi^a" antibody. 410 (1.2 %) were positive for Lewis antibodies and 144 (0.43%) positive for the Rhesus antibodies (71 Anti-D, 56 Anti-E, 10 Anti-c, 6 Anti-C and lanti-e).

Of the 655 blood donors screened for the GP Mur (Mi III) phenotype, 306 were Chinese, 249 Malays and 100 Indian. The prevalence of the antigen was 3.8% with the highest rate in the Chinese group (4.9%). The prevalence of the antigen in the Malays was 2.8% and in Indians 3%.

TABLE 1: Prevalence of Miltenberger antibodies in general and antenatal patients

Ethnic Group	General in-patients		Antenatal patients		Total	
	Total investigated	Positive No. (%)	Total investigated	Positive No. (%)	Total investigated	Positive No. (%)
Chinese	7117	23 (0.3%)	1899	6 (0.3%)	9016	29 (0.3%)
Malays	10130	20 (0.2%)	6375	10 (0.2%)	16505	30 (0.2%)
Indians	5644	10 (0.2%)	1923	4 (0.2%)	7567	14 (0.2%)
Others*	428	3 (0.7%)	200	1 (0.5%)	628	4 (0.6%)
	23319	56 (0.2%)	10397	21 (0.2%)	33716	77 (0.2%)

TABLE 2: Screening and investigations for irregular antibodies in patients of the University of Malaya Medical Centre

Year investigated		1999 - 2000	
No. specimens screened for antibodies		33716	
No. submitted for antibody identification		2136	
Single Antibodies		Multiple Antibodies	
Type		Type	
Anti D	71	Anti Le ^b , PI	1
Anti C	6	Anti Le ^a , Le ^b	374
Anti E	56	Anti C, D	6
Anti e	1	Anti E, c	11
Anti c	10	Anti E+c+Le ^b	1
Anti Le ^a	159	Anti E + c + S	1
Anti Le ^b	251	Anti D, K	1
Anti M	8	Anti D, Jk ^a	1
Anti N	1	Anti E, c, S	1
Anti S	7	Anti Le ^a +Le ^b +E+c+Fy ^b +Jk ^b +S	1
Anti P,	70	Cold antibody and Le ^b	1
Anti Fyb	2	Cold antibody and Le ^a	1
Anti Jk ^a	6	Anti JK ^a + Le ^b	1
Anti Jk ^b	2	Warm auto +allo anti -E, c	1
Anti-"Mi^a"	77	Warm auto + allo -S	2
Anti I	74	Warm auto non- specific + auto Anti D	1
IgG anti B	2	TOTAL	405
IgG anti A, B	1		
Anti k	2	Others	
Anti Kell	3	Non- specific antibody	577
		Non specific cold	230
Para Bombay	1	Non specific auto IgG	109
Bombay O _h	2	High titre cold agglutinins	3
TOTAL	812	TOTAL	919

DISCUSSION

Our findings have provided an insight into the prevalence of anti-"Mi^a" in patients and the corresponding GP Mur (Mi III) phenotype in blood donors at a tertiary hospital in Peninsula Malaysia. The anti-"Mi^a" antibody was the third most commonly detected antibody in our patients, the most common being the Lewis antibodies followed by those directed against the Rhesus antigens. The alloantibody was found in all the three ethnic groups tested, but the prevalence (0.2%) was somewhat lower than that found in studies elsewhere. In Hongkong, the antibody was found in 0.34 % of in-patients and 0.46% of pregnant women³. It was detected in 0.28 % of patients in Taiwan² and 0.20 % of patients in Thailand.⁴ The corresponding GP Mur (Mi III) phenotype among Malaysian blood donors was 3.8%. It was detected not only in the Chinese but also in Malay and Indian blood donors. However, the prevalence among our Chinese donors (4.9%) was lower than in Chinese populations studied in other countries in the region (Taiwan 7.3%,⁵ Hongkong 6.3%⁶ and Thailand 9.7%⁴) probably because of the small number of donors studied. The detection of the anti-"Mi^a" antibodies and GP Mur (Mi III) antigen in ethnic groups other than the Chinese is a noteworthy finding as such information is not well-documented.

Because of the many reports of clinical problems associated with the Miltenberger antibodies, the routine testing of all antenatal cases for anti-"Mi^a" is warranted, and the work-up of neonatal jaundice or suspected haemolytic disease of the newborn should include testing of anti-"Mi^a". It is important that the GP Mur red cells be included in the screening panels for group and screen procedures in countries with a significant Asian population. Similar studies need to be carried out in other ethnic groups in Sabah and Sarawak (East Malaysia).

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