

GENETICS

Blood Groups of the Chinese in Calcutta

THE purpose of this investigation was to record the distribution of A₁A₂BO, MN, Rh, Kell and Duffy blood groups and of ABH secretor factor and haemoglobin variants, if any, of the Chinese in Calcutta, most of whom are reported to have migrated from Canton about two or three generations ago. They live in groups and do not seem to intermingle with Indians.

Table 1. DISTRIBUTION OF ABO, A₁A₂BO, MN, Rh, DUFFY AND KELL BLOOD GROUPS AND SECRETOR FACTOR AMONG THE CHINESE IN CALCUTTA

ABO system					A ₁ A ₂ BO system*									
Phenotypes (number and per cent)					Phenotypes (number and per cent)									
O	A	B	AB	Total	O	A ₁	A ₂	A ₁ B	A ₂ B	Total				
512 (44.4)	170 (30.13)	113 (20.00)	31 (5.37)	566 (100.00)	355 (46.33)	142 (25.06)	12 (2.21)	113 (20.79)	50 (4.57)	543 (100.00)				
p					r									
1:25					1:49									
A ₁ A ₂ BO system* (per cent)					MN system (number and per cent)									
P ₁	P ₂	q	r	Total	MN	NN	Total	Genes (per cent)	Rh system (tested with anti-D only) (per cent)					
16.47	1.80	13.88	68.07	89 (29.96)	82 (40.71)	208 (100.00)	100.00 (100.00)	53.83	40.17	473 (99.79)	0.21	100.00	95.42	4.58
Rh system (Tested with anti-C, -c, -D, -E and -e only)					Chromosomes (per cent)									
Phenotypes (number and per cent)					Phenotypes (per cent)									
CDe	cDE	CdE	cDE	CDE	ode	CdE	Total	CDE	CDe	CdE	cDE	ode		
82 (9.22)	10 (1.13)	12 (1.36)	48 (5.41)	8 (0.90)	1 (0.13)	0	101 (100.00)	0.48	70.65	22.25	3.63	9.84		
Duffy system					Kell system									
Phenotypes (number and per cent)					Phenotypes (number and per cent)									
Fy(a-)	Fy(a-)	Total	Fy ^a	Fy ^b	Kell+	Kell-	Total	K	k	Secretor	Total	Se	se	
122 (96.08)	5 (3.94)	127 (100.00)	80.16	19.84	1	131	132 (100.00)	0.38	99.62	406	149 (100.00)	555	48.10	51.81

Figures in parentheses represent expected percentage.

* Obtained from ABO data.

During June-December, 1955, blood specimens were collected mainly from students and teachers of three Chinese schools in Calcutta and were tested for blood group antigens like A, A₁, A₂, B, M, N, C, c, D, E, e, Kell (K) and Duffy (Fy^a), but because of non-availability of antisera all the specimens could not be tested for every antigen. All the antisera with the exception of anti-A and anti-B were received from 'DADE' in U.S.A. Kell and Duffy antigens were determined by Coombs test, while other antigens were determined by standard methods. The specimens of saliva were examined by the method of Race and Sanger¹ for ABH secretor factor. Paper electrophoresis technique was used for the detection of haemoglobin variants. All the results have been summarized in Table 1.

In a sample of 566 individuals, 44.5 per cent belong to group O, 30.0 per cent to group A, 20.0 per cent to group B and 5.5 per cent to group AB. The maximum likelihood estimates of p, q and r for three allelomorphous genes A, B and O are 19.7, 13.6 and 66.7 per cent respectively. The incidence of B gene in China is less than 20 per cent and that of A gene is more than 20 per cent, in contrast to India and South Eastern Asia where B is generally in excess of A (ref. 2). The incidence of B in China, however, is greater than is found in Europe. It has been noted³⁻⁷ that the Chinese are characterized by complete absence of A₂ gene but as in the present investigation, occurrence of A₂ gene at a low frequency has also been reported.^{8,9}

Among the Chinese the incidence of M gene is greater than that of N and it varies from 69.5 per cent to 63.0 per cent against 60 per cent to 70 per cent in India. The frequency of M gene obtained in the present investigation is 53.8 per cent while its mean value calculated by pooling the results of all workers¹⁰⁻¹⁴ including ours is 68.9 per cent.

The gene frequencies for D and d among 474 Chinese in Calcutta are 95.4 per cent and 4.0 per cent respectively, giving 99.8 per cent Rh-positive and 0.2 per cent Rh-negative individuals. In the detailed analysis of Rh groups, the chromosome frequencies are in general agreement with those previously reported¹⁵⁻¹⁸. The Chinese differ from the Indians in having a higher frequency of CDe and a lower frequency of cde chromosomes.

The Duffy positive is almost universal in Chinese as observed by Miller *et al.*¹⁹ and Layton²⁰ and Arnold²¹, while 99 per cent among 127 individuals in the present survey are

found to be Duffy positive giving approximately 80 per cent of Fy^a genes. One of 132 individuals examined was found to be Kell positive, Earlier Miller *et al.*¹⁹ and Sussman²² reported complete absence of Kell antigen in the blood of the Chinese.

In the present survey of 555 individuals, 73 per cent were secretors and 27 per cent non-secretors; the gene frequencies for secretors and non-secretors were 48.2 per cent and 51.8 per cent respectively. As far as we know, this is the first report of the distribution of secretor factor among the Chinese. No abnormal haemoglobin was detected.

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