Toxoplasma antibody survey in West Malaysia

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Introduction

IN WEST MALAYSIA, studies of infectious mononucleosis among Asians revealed that a very high proportion of patients whose sera were negative for heterophil-antibody had clinical features typical of toxoplasmosis as well as infectious mononucleosis (I.M.). How many of these I.M.-negative cases were in fact due to toxoplasmosis is not known.

Since the problem of human toxoplasmosis has never been investigated in W. Malaysia, an antibody survey to determine the status of this disease in the population was carried out. The results are presented in this paper.

Material and Methods

Sera were collected from 728 normal persons of different age groups, races and occupations from various parts of W. Malaysia. Among the occupational groups studied were veterinarians, padi planters, oil palm and rubber estate workers, miscellaneous labourers and tin miners.

The antibodies were assessed by the Indirect Haemagglutination reaction (IHA). Formalised and tanned sheep red cells were used for the test. The antigen for sensitisation was prepared according to the method of Jacobs and Lunde (1957). The parasites were obtained from mice previously infected with the Rh strain of Toxoplasma. Initially, the test was done in tubes but later testing was done in plates using the microtiter technique. With the tests done in tubes the significant titre was taken as 1:200 or above and with the microtiter technique the significant titre was taken as 1:160 or above.

Results and Discussion

The overall antibody ratio was found to be 13.9% or 101/728. The highest incidence was in Malays (21.8% or 56/257), followed in turn by Indians (13.5% or 34/251) and Chinese (5.0% or 11/220) — see Table 1.

Table 1
Distribution of Toxoplasma Antibodies among W. Malaysian by Age-Group and Race

Age group (in years)	Malay			Indian			Chinese			Total		
	No. exam.	Pos.	%	No. exam.	Pos.	%	No. exam.	Pos.	%	No. exam.	Pos.	%
0 — 10	50	9	18.0	50	4	8.0	50	7	14.0	150	20	13.3
11 — 20	54	11	20.4	52	9	18.0	51	1	2.0	157	21	13.4
21 — 30	76	11	14.5	69	8	11.6	66	1	1.5	211	20	9.5
30+	77	25	32.5	80	13	16.3	53	2	3.8	210	40	19.0
Total	257	56	21.8	251	34	13.5	220	11	5.0	728	101	13.9

It is now known that toxoplasmosis can be acquired either by the ingestion of infected meat or by the ingestion of Toxoplasma oocysts passed in the faeces of the domestic cat. However, it is not certain as to which of these modes of infection is more important, as far as humans are concerned. In Singapore, porcine toxoplasmosis is quite common where 26% of the animals shows antibodies to the parasite (Zaman *et al.*, 1967). Similarly, antibody surveys done in Malaysia show that 9.5% of goats, 11.2% of buffaloes, 0.1% of cattle and 12.5% of pigs have positive sera (Mulkit Singh *et al.*, 1967).

Inspite of the fact that pigs have the highest infection rates among domestic animals, the Chinese population who consume pork more than any other meat have the lowest infection rate. The explanation for this could be that the Chinese in Malaysia and Singapore usually cook their meat very thoroughly before eating, thus avoiding infection. The Malays as an ethnic group have the highest infection rate. This was also observed in a previous survey done in Singapore (Zaman and Goh, 1969). The greater association of the domestic cat with the rural Malay population could be an explanation for this. In Malay kampongs, dogs are generally not kept for religious reasons, but cats are commonly kept as pet animals.

The incidence in males (14.8% or 86/582) was only slightly higher than that in females (10.3% or 15/146). The age group distribution is presented in Table 1. Antibodies were acquired early in life. A decline in antibody rate may be detected in all 3 races in the 21-30 age group. The reason for this is obscure.

The Malays showed high rates throughout the various ages with the maximum incidence in the oldest age group. The highest incidence in the Chinese, on the other hand, was the youngest group, declining towards the older age groups. This seems to indicate that the Malays are constantly and frequently exposed to toxoplasmosis, whereas the Chinese are exposed mainly during childhood. The Indians also appear to be equally exposed throughout the various age groups.

Of the 5 occupational groups investigated, the padi planters showed the highest incidence (22.2% or 20/90), even exceeding that of the veterinarians (20.0% or 26/130), authough the difference may not be significant (Table 2). Estate workers, working in oil palm and rubber estates, and labourers dealing with anti-malarial work showed moderate rates (13.5% and 10.1%, respectively). The tin miners who work in underground mines had a very low incidence (3.7% or 1/27).

Table 2
Distribution of Toxoplasma Antibodies among five Occupational Groups in West Malaysia

Group	No. examined	No. positive	%
Padi planters	90	20	22.2
Veterinary Staff	130	26	20.0
Estate workers	52	7	13.5
Antimalarial labourers	109	11	10.1
Tin miners (lode mine)	27	1	3.7

Table 3
Racial Distribution of Toxoplasma Antibodies among Veterinary Staff Members

Race	No. examined	No. positive	%
Malay	59	15	25.4
Indian	51	10	19.6
Chinese	20	1	5.0
Totals	130	26	20.0

It is interesting to note that in the veterinary group alone, the racial distribution of antibodies follows the same general pattern, viz. highest in the Malays, lower in the Indians and lowest in the Chinese (Table 3).

As the padi planters exist in a farm environment where domestic animals and cats are often kept, and the veterinary staff come in constant contact with animals, it is understood why their antibody rates are high. Estate workers and labourers also work in a rural environment but do not come in much contact with animals. The tin miners generally have much less animal contact as compared to the padi planters and farmers.

The distribution of toxoplasma antibody titres in the various age groups is given in Table 4. As 2 methods were used, the 2 dilution systems are presented. The majority of the positive sera revealed titres among the lower ranges (1:160 to 1:400). Three had very high titres (1:10,240), two of which belonged to children of 0-10 years of age and one to a teenager. This probably indicated recent infections. Moderately high titres (1:300 to 1:6400) were found mainly among the older age groups due probably to booster reactions. Below these, the titres were more or less equally distributed among the various age groups.

The prevalence of antibodies to Toxoplasma varies widely in different parts of the world (Chandler and Read, 1961). In Southeast Asia, surveys done in Singapore showed a prevalence rate of 17.2% using the IHA reaction (Mulkit Singh *et al.*, 1968). In Indonesia, 8.9% of the population examined in Surabaja were positive (Yamamoto *et al.*, 1970.) In Hongkong, an overall incidence of 6.2% was obtained in the adult population using the dye-test. The same survey showed that 71% of the pigs imported from China were positive (Ludlam *et al.*, 1969). The authors remarked that the lower incidence amongst the predominantly Chinese population of Hongkong could be due to eating pork in "small lumps and only when it is well cooked."

Summary

A serological survey for toxoplasma antibodies employing the IHA test was conducted on 728 normal persons of different age groups, races and occupations from various parts of W. Malaysia. The overall antibody ratio was found to be 13.9%. The Malays were most highly infected (21.8%), followed in turn by the Indians (13.6%) and the Chinese (5.0%). Possible reasons for this are given.

The incidence in males was only slightly higher (14.8%) than that in females (10.3%). Antibodies were acquired early in life and a general upward trend was observed with increase in age.

Of 5 occupational groups studied, the padi planters and veterinary staff showed the highest incidence (22.2% and 20.0% respectively). Estate and anti-malaria workers had moderate rates (13.5% and 10.1%, respectively) and tin miners (of underground mines) had the lowest rate (3.7%).

The distribution of toxoplasma antibody titres in the various age groups was also studied. The majority of the positive sera revealed low titres.

The antibody ratios of some Southeast Asian countries are compared.

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Table 4

Distribution of Toxoplasma Antibody Titres in Various Age Groups

	Titres* in macro test	200		400		800		1600		3200		6400			
	Titres* in macro test	160	320		640		1280		2560		5120			10,240	
Age groups (in years)	0 — 10	5	0	7	0	1	0	3	0	2	0	0	0	2	20
	11 — 20	6	0	3	1	5	2	0	0	3	0	0	0	1	21
	21 — 30	2	8	0	3	0	0	2	1	1	3	0	0	0	20
	30+	4	9	3	7	1	3	0	8	0	3	0	2	0	33
	Totals	17	17	13	11	7	5	5	9	6	6	0	2	3	101

*Expressed as reciprocals.

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