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Serum immunoglobulin levels in the Semai

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Introduction

THE SEMAI are a tribe of aborigines (orang asli) found in West Malaysia. They are jungle dwellers and still lead a comparatively primitive way of life. They number approximately 15,000 (Chander, 1970). To our knowledge, no comprehensive study of the immunoglobulin levels of West Malaysian aborigines has been reported. In this study the levels of serum IgG, IgA and IgM of the Semai were measured for purposes of documentation and comparison with other populations. This study forms part of a detailed analysis of the immunological status of the aborigines of West Malaysia.

Materials and Methods

Sera were collected from 108 apparently healthy subjects whose ages ranged from 1 to 55 years. There were 41 males and 67 females of whom 14 were pregnant (above 34th week gestation). 14 cord blood samples were also collected. Sera were obtained from visitors accompanying patients at the Aboriginal Hospital in Gombak, 12 miles east of the Malaysian capital, Kuala Lumpur, as well as from inhabitants of two Semai villages in the state of Perak, about 120 miles north of Kuala Lumpur. All subjects were screened for hepatosplenomegaly and malarial parasites in the blood. Subjects with hepatosplenomegaly or a positive malarial blood film were excluded from the study.

The levels of IgG, IgA and IgM in the sera were measured by the Mancini radial immunodiffusion method using antisera and immunoglobulin standards provided by Professor K.J. Lindqvist (Nantulya and Lindqvist, 1973).

Results

The mean values of IgG, IgA and IgM by age and sex are shown in Table 1. The difference in levels of IgA and IgG between sexes were not found to be significant except in females of the 13 – 20 years age group where the mean level of IgA in females was higher. The mean level of IgM in females was significantly higher than in males in all age groups.

The mean levels of IgG, IgA and IgM among adult Semais (21 years and above) were significantly higher than corresponding levels in adult urban non-aboriginal Malaysians (Table 2).

In 7 mother-child pairs there was no significant difference in IgG levels which were measured by a double blind technique (Table 3). Also, no significant difference was found in the mean immunoglobulin levels between the 14 pregnant subjects and 18 randomly selected non-pregnant women in the reproductive age group (16 – 40 years) (Table 4).

Discussion

Immunoglobulin levels in persons living in tropical areas have been found to be higher than in persons living in temperate areas (McFarlane, 1973). However, immunoglobulin levels in the urban Malaysian population were found to be similar to those reported in temperate areas (Shah and Yadav, 1973). In our study we have found the immunoglobulin levels in the adult Semai to be significantly higher than those of the urban non-aboriginal Malaysian population. This may be attributed to the fact that the Semai are more exposed to infections of blood

Table 1

Mean serum immunoglobulin levels of the Semai by age and sex (1976) (mg/100 ml)

Age (years)	IgG			IgA			IgM		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Cord serum	–	–	1201 ± 458 (14)**	–	–	tltr†	–	–	tltr†
1 – 4	1086 ± 225 (3)	1283 ± 335 (10)	1238 ± 320 (13)	117 ± 58 (3)	118 ± 62 (10)	117 ± 59 (13)	208 ± 43 (3)	305 ± 133 (10)	282 ± 124* (13)
5 – 12	1612 ± 281 (17)	1563 ± 263 (15)	1589 ± 280 (32)	150 ± 30 (17)	155 ± 44 (15)	152 ± 40 (32)	267 ± 77 (17)	305 ± 117 (15)	274 ± 101* (32)
13 – 20	1505 ± 187 (10)	1567 ± 301 (19)	1546 ± 265 (29)	151 ± 30 (10)	206 ± 105 (19)	187 ± 89* (29)	269 ± 124 (10)	393 ± 181 (19)	350 ± 170* (29)
21 and above	1523 ± 297 (11)	1475 ± 522 (23)	1490 ± 461 (34)	269 ± 86 (11)	284 ± 156 (23)	279 ± 145 (34)	357 ± 367 (11)	403 ± 226 (23)	387 ± 276* (34)

* Significant difference between sexes ($p < 0.01$).
** Figures in brackets denote size of sample.
tltr† too low to read.

Table 2

Comparison of mean immunoglobulin levels of adult Semai with adult urban non-aboriginal Malaysians* (levels in mg/100 ml)

Population	IgG			IgA			IgM		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Semai (Present study)	1523 ± 297 (11)	1475 ± 522 (23)	1490 ± 461 (34)	269 ± 86 (11)	284 ± 156 (23)	279 ± 145 (34)	357 ± 367 (11)	403 ± 226 (23)	387 ± 276 (34)
Urban non-aboriginal Malaysians (Shah and Yadav, 1973)	1081 ± 444 (90)	1164 ± 358 (27)	1100 ± 427 (117)	170 ± 80 (88)	186 ± 105 (28)	174 ± 89 (116)	143 ± 89 (95)	258 ± 104 (26)	167 ± 104 (121)

* Significant difference ($p < 0.01$).

Table 3

IgG levels in Semai mother-infant pairs (mg/100 ml)

Pair No.	Cord Serum	Mother's Serum
1	1290	1000
2	1100	1250
3	900	1140
4	250	1100
5	2000	2200
6	1700	2000
7	450	1000
Mean	1100 ± 631	1380 ± 513*

* No significant difference ($p > 0.05$).

as well as intestinal parasites. Routine screening of aboriginal patients and relatives accompanying these patients at the Aboriginal Hospital in Gombak revealed that approximately 70% of the population harbour intestinal helminths and approximately 8% have a positive blood film for malaria (Khoo, 1976: Personal Communication). These figures give a fair representation of the "normal" aboriginal population as it is customary for each patient to be accompanied by a large number of his relatives (Bolton, 1973). A comparison between the immunoglobulin levels in Semai children and adolescents with non-aboriginal Malaysians is not possible as no data on the latter group are available.

Immunoglobulin levels in the Semai generally resemble those observed in other indigenous populations in the tropics (McFarlane, 1973; McFarlane and Voller, 1966; Turner and Voller, 1966; Wells, 1968). In a study of the Bantu and Pygmy (Simbeye, 1970) the mean values of IgG were found to be 3220 mg/100 ml and 2780 mg/100 ml respectively. These are higher than that in the Semai (1490 mg/100 ml). In the Bantu and Pygmy study however subjects with hepatosplenomegaly and blood parasites were not excluded; this factor may contribute to the difference.

Our results show that Semai children attain adult IgG levels by the 5th year of age. This contrasts sharply with the pattern observed in an urban North American population where adult IgG levels are only reached by the 16th year (Stiehm and Fudenberg, 1966). It is possible that this discrepancy arises from the early exposure of Semai children to a wide range of bacterial, mycotic, parasitic and viral diseases. A similar developmental pattern of IgG levels has been reported in a Gambian community (Rowe *et al.*, 1968).

It is of interest to note that IgG levels in an African Negro population were higher in maternal than their respective infants' cord sera (McFarlane and Udeozo, 1968). In contrast IgG levels were lower in Caucasian mothers than in cord sera from their infants (Michaux *et al.*, 1966). It has been suggested that the cord IgG level is dependent on both placental transfer and synthesis by the fetus itself (McFarlane and Udeozo, 1968). We have found no significant difference in the IgG levels between mother and their respective infants' cord sera.

Values of IgG appeared to be lower in pregnant women in Gambia (Rowe *et al.*, 1968). In our study we find no significant difference in the IgG level between pregnant and non-pregnant women.

Further studies on the levels of immunoglobulins in mother-child pairs and in pregnant and non-pregnant Semai women are in progress using larger population samples.

Summary

The serum levels of IgG, IgA and IgM were measured in 108 Semai subjects and 14 cord blood samples. The mean adult levels of IgG, IgA and IgM in the Semai were significantly higher than in the corresponding levels in adult urban non-aboriginal Malaysians. Semai children attain adult levels of IgG by their 5th year. No significant difference was observed between the mean IgG levels of maternal sera and their respective infants' cord sera.

Table 4

Comparison of mean immunoglobulin levels of non-pregnant and pregnant Semai females (mg/100 ml)*

	No. of Subjects	IgG	IgA	IgM
Pregnant	14	1327 ± 455	241 ± 145	412 ± 235
Non-pregnant**	18	1618 ± 508	300 ± 172	392 ± 208

* No significant difference ($p > 0.05$).
** Random sample from non-pregnant Semai females.

No significant difference was observed in the mean IgG, IgA and IgM levels between pregnant and non-pregnant Semai females.

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