Serum proteins, haematocrits, heights and weights of Aborigine subjects in West Malaysia

by A. Brearley

Gombak Aborigine Hospital,
Jalan Parry, Kuala Lumpur,
Malaysia.

Introduction

THE PRESENT paper is a record of the results of a study of the serum proteins, the haematocrits, the heights and weights of apparently healthy aborigines in West Malaysia. Differences have previously been observed in ethnically and geographically diverse groups, presumably related to genetic factors, diet and exposure to certain diseases. It is important that the normal variations in these values for any single population should be understood before any interpretation of a particular pathological condition is made. These results are presented because no previous determinations of these quantities for aborigines in West Malaysia have been published. The results are compared with those from other ethnic groups both in West Malaysia[1] and elsewhere[2, 3].

Materials and Methods

A total of 109 aborigine subjects, aged 4-45 years took part in the study (48 males and 61 females). The aborigines are composed of a number of ethnic groups whose common factor is that they are descendants of the original inhabitants of Malaya[4]. Most live on the jungle slopes of the central mountain range of northern Malaya and the remainder are scattered over the rest of the peninsula. Twenty-one of the subjects were classified as "deep jungle" aborigines – i.e. those who live in small units at a relatively high altitude and have little contact with other races. The other 88 subjects were considered as "fringe jungle" aborigines – i.e. those who live in closer contact with other ethnic groups in the ecologically more disturbed outskirts of the forest. Each class comprises more than one ethnic group but differences in diet, and exposure to diseases, especially parasitic, could cause a divergence in biochemical values. All the subjects entered Gombak Hospital near Kuala Lumpur between April and August 1968. They were accompanying members of their family who were sick, but the subjects themselves were apparently healthy persons. All were bled within two days of their arrival at Gombak when their haematocrits, heights and weights were also measured.

Total proteins were determined at Gombak Hospital by the Biuret method of Wooton[5]. All determinations were done in duplicate and at the same time a Verstol or Hyland Biochemical control sera was assayed to within acceptable limits. The serum protein fractions were determined at the Institute of Medical Research, Kuala Lumpur, by paper electrophoresis on 2.5 x 12.0 cm. strips, using barbitone buffer, pH 8.6, ionic strength 0.05-0.07M, in a Shandon horizontal electrophoresis tank. 3 ut. were applied to each strip and adequate separation was obtained after two hours at 25° C. Fixing was done in 5% trichloracetic acid for at least 5 minutes. The strips were stained for 10 minutes in 0.2% solution of Poncean S in 3% trichloracetic acid, removed and washed in 5% trichloracetic acid and dried between blotting paper. The individual bands were cut out and

Table I. Total serum proteins by age in Aborigine subjects, West Malaysia.

Age (years)	4-9	10-14	15-45
No. subjects (male & female)	18 (11 + 7)	12 (3 + 9)	68 (32 + 36)
Mean (± S.D.)* (gms./100ml.)	7.8 (± 0.7)	8.4 (± 0.6)	8.0 (± 0.6)
	Percent Distribution		
7.0 (gms/100 ml.)	5.6	0.0	7.4
7.0 – 7.9	66.6	25.0	44.1
8.0	27.8	75.0	48.5

* S.D., standard deviation.

Table II. Serum albumin, total globulin and gamma globulin levels by age in Aborigine subjects, West Malaysia.

Age (years)		4-9	10-14	15-45
No subjects (M + F)		17 (10 + 7)	12 (3 ± 9)	44 (20 ± 24)
Mean + albumin (± S.D.)		4.4 (± 0.5)	4.8 (± 0.7)	4.5 (± 0.2)
Mean + total globulin (± S.D.)		3.3 (± 0.5)	3.5 (± 0.5)	3.4 (± 0.5)
Mean + -globulin (± S.D.)		1.5 (± 0.5)	1.6 (± 0.3)	1.6 (± 0.4)
		Percent Distribution		
Albumin:	3.5 (gms/100 ml)	0.0	8.3	45.
	3.5 – 4.4	47.0	16.7	36.5
	4.5 – 4.9	41.2	33.3	45.5
	5.0	11.8	41.7	13.6
Total globulin:	2.0 – 2.9	29.4	8.3	22.7
	3.0 – 3.5	41.2	41.7	40.9
	3.6 – 4.0	23.5	33.3	20.5
	4.0	5.1	16.7	15.9
globulin:	0.5 – 0.9	17.6	0.0	4.6
	1.0 – 1.4	41.2	50.0	40.9
	1.5 – 1.9	23.6	41.7	31.8
	2.0	17.6	8.3	22.7

+ Mean values in gms. per 100 ml.

Table III. Haematocrit levels by age in Aborigines and civilian and military dependants, West Malaysia.

	Aborigines			Civilian and Military dependants	
Age (years)	No. subjects (M+F)		Mean+ (± S.D.)	No. subjects (M+F)	Mean+ (± S.D.)
4-9	24 (12 + 12)	35 (± 4.5)	114 (55 ± 59)	38.6	
10-14	14 (3 + 11)	39 (± 5.0)	144 (80 ± 71)	39.7	
15-45	32 M	45 (± 4.0)	80 M	44.8 (± 3.6)	
15-45	35 F	39.5 (±4.5)	108 F	39.0 (± 4.3)	

+ Haematocrit expressed as mean percent.

Table IV. Height and weight by six in Aborigines, aged 20 years and above, in West Malaysia.

Sex	Height (inches) Male	Female	Weight (pounds) Male	Female
No. subjects	29	31	28	29
Mean (± S.D.)	62.0 (± 2)	57.5 (± 3)	110 (± 9)	96 (± 17)

Table V. Height, weight and age of Federation of Malaya Armed Forces[1]

	Mean Height (inches)	Mean weight (pounds)	Mean age (years)
Malays	65.2	127.7	25.1
Chinese	64.0	125.5	23.6
Indians	65.7	131.0	23.0
Average all races	64.1	127.7	25.8

Table VI. Comparison of "normal values" for adults. (All values in gm. per 100 ml. + S.D.)

	Total protein	Albumin	Total globulin	Globulin
Malayan aborigines	8.0 (± 0.6)	4.5 (± 0.2)	3.4 (± 0.2)	1.6 (± 0.4)
Malays & Malayan Chinese and Indians[1]	7.5 (± 0.6)	3.9 (± 0.5)	3.5 (± 0.8)	
148 New York Caucasians[2]	7.08 (± 0.56)	4.47 (± 0.53)	2.60 (± 0.44)	1.07 (± 0.28)
93 New York Peurto Ricans[2]	7.41 (± 0.55)	4.66 (± 0.49)	2.74 (± 0.40)	1.26 (± 0.26)
72 New York Negroes[2]	7.17 (± 0.46)	4.20 (± 0.47)	2.96 (± 0.37)	1.43 (± 0.32)
50 Ibadan Nigerians[3]	6.8 (± 0.4)	3.35		3.45 2.10
25 Ibadan Europeans[3]	6.9 (± 0.6)	4.05		2.85 1.20

Table VII. Comparison of "normal values" for children (All values in gm. per 100 ml. + S.D.)

	Total protein	Albumin	Globulin
Age 4-9 years:			
Aborigines	7.8 (± 0.7)	4.4 (± 0.5)	3.3 (± 0.5)
Malays & Malayan Chinese and Indians	7.2 (± 0.6)	3.7	3.4 (± 0.8)
Age 10-14 years:			
Aborigines	8.4 (± 0.6)	4.8 (± 0.7)	3.5 (± 0.5)
Malays & Malayan Chinese and Indians	7.4 (± 0.5)	3.8	3.6

the strained protein eluted in 0.2 N sodium hydroxide. The colour intensity was measured at 570 mu. Micro-haematocrits were measured from venous blood and were taken to the nearest 0.5 percent. Heights were taken to the nearest 0.5 inch and weights to the nearest pound. Age estimation is based on the patient's or parents' statement and is at best approximate.

Results

Complete serum protein data was available on 73 subjects. The mean results and standard deviations for the various age groups are summarized in Tables I and II. The mean results and standard deviations for haematocrits in Aborigines are summarized in III. All the females taking part in these studies were non-pregnant and non-lactating. Table IV summarized the mean heights and weights of adult Aborigine subjects.

There was no significant difference in means for albumin or globulin between fringe jungle and deep jungle groups (albumin, respectively, 4.6 $\pm$ 0.6 gm. per 100 ml. and 4.4 $\pm$ 0.6 gm. per 100 ml.: globulin 1.5 $\pm$ 0.4 and 1.7 $\pm$ 0.4). There was, however, a tendency for a higher proportion of the deep jungle subjects to have a higher globulin (over 1.5 gm. per 100 ml.), shown by a X^2 of 3.878 (0.02 P 0.05).

Comments

The values for total serum protein, albumin, total globulin and globulin in the present study are compared in Table VI with those found by the 1962 ICNND (Inderdepartmental Committee on Nutrition for National Defence) Survey for Malay and Malayan Chinese and Indian military personnel and departments, and also with those ethnic groups studied in New York by Seigal et al.[2] and with two ethnic groups studied in Nigeria by Edozein[3]. The values for children are compounded in Table VII with those of the ICNND study. The Aborigines in each age group have higher total protein levels than the other populations. At least for the adult aborigines and the Malayan ethnic groups, the differences are considered statistically highly significant (p 0.001). These higher protein levels are due to higher levels of both γ–globulins in comparison with the New York groups, but due to higher albumins in comparison with the Malayan groups. In comparison with the Ibadan Europeans, they are due to both higher globulin and albumin levels. Various physicians of the Aborigine Medical Service have observed that the more varied diet of the Aborigines may lead to their having a better nutritional state (and thus higher albumins) than rural Malays. However, both groups would appear to be exposed to similar disease problems since their globulins are comparable. The amount of serum gamma globulin reflects in part the activity of the immune mechanism, the effects of past exposures to antigenic stimulation, and the rate of metabolism of gamma globulin . No correlation were found between γ–globulins and albumins, between γ–globulins and haematocrits, or between albumins and heights in Aborigine subjects.

The values for haematocrits in the present study are compared in Table III with those found by the ICNND survey. In the higher two age groups, the haematocrit levels are comparable but in the 4-9 years age group, the Aborigines have lower haematocrits. In both populations, the haematocrits levels tend to decrease with age.

Table V summarizes the mean heights and weights of military personnel[1]. The male Aborigine subjects have lower heights and weights than those of the Armed Forces.

The number of children and of deep jungle subjects used in the study is small and more work remains to be done in order to be able to compare the protein levels of deep and fringe jungle subjects.

Acknowledgement

The author would like to thank Dr. De Witt and the Department of Biochemistry, Institute for Medical Research, Kuala Lumpur for carrying out the protein electrophoresis and the laboratory technicians at Gombak Hospital for measuring the haematocrits and heights and weights; and is grateful to Dr. R.H. Gilman and Dr. D.A. McKay for their advice and criticism, also to Dr. J.M. Bolton, Medical Officer for Aborigines, for his cooperation.

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