Lep. Rev. (1966) **37**, 3, 147/150

Leprosy and Blood Groups

M. S. POVEY, B.A. (CANTAB)
University College Hospital, London, W.C.1
R. J. HORTON, B.A. (CANTAB)
St Bartholomew's Hospital, London, E.C.1

Hsuen, Thomas and Jesudian (1963) described work suggesting an increased incidence of leprosy in blood group O and a decreased incidence in blood group B when compared with controls. The population studied were leprosy patients at the Schieffelin Leprosy Research Sanatorium, Karigiri compared with blood donors from the Christian Medical College, Vellore, about 10 miles away. Since the finding of such a difference between patients and controls was suggestive of genetic factors operating in leprosy, it was decided that a repeat of this work should be included in a general study of leprosy and genetics carried out in the same area in 1964.

Materials and Methods

1085 patients were examined between June and August 1964. All were being treated for leprosy at that time. They included inpatients and outpatients at the Leprosy Research Sanattorium, Karigiri and at the Christian Medical College Hospital, Vellore, together with patients from roadside clinics and leprosy clinics held in local villages. A group of inpatients from Vadathorasalaur hospital, 100 miles away from Vellore, was also included. The overlap of patients with the previous survey did not exceed 2 per cent. All blood donors were first attenders at the Blood Transfusion Centre, Vellore between January and August 1964.

ABO grouping was carried out in India using dried Anti-A and Anti-B sera and wells. Wherever possible leprosy was classified into Lepromatous, Dimorphous, or Tuberculoid patients mostly by leprologists, occasionally by other medical staff. In about 70 patients histology slides were available and these were photomicrographed and later examined at the Leprosy Research Fund, London by Dr Cochrane and Dr Harman. The agreement between clinical and histological diagnoses was good and we feel confident that they represent a uniform classification. Details of sex, age group, and village of origin of patients was also recorded.

In addition to the ABO testing, serum was sent back to England for tests on haptoglobins and transferrins which were carried out by Dr Garlick at University College, London.

Results

The overall blood groups in Leprosy patients and blood donors are shown in Table 1. The blood groups of donors in 1962 are also included (Hsuen et al, 1963) since they are a larger sample and could presumably be pooled with the present donors.

There is no significant increase in the frequency of group O and decrease of group B in leprosy patients compared with Blood donors ($X_1^2 = 1{\cdot}7$; $P > 0{\cdot}1$). In view of the difference between the present results and those of Hsuen, it was decided to examine these populations in more detail.

In the leprosy patients the sex ratio was 2:1, whereas in the blood donors it was 15:1. However no difference in blood group distribution was found in the two sexes. (Table 2).

In view of the fact that the leprosy patients came from a rather wider area than the blood donors, the results obtained in patients coming from within a radius of 30 miles from Vellore were examined. (Table 3). There is no significant difference from the blood donors ($X_1^2 = 2{\cdot}5$; $P > 0{\cdot}1$ for O:B ratio). In view of the previous work this X^2 may lead to some suspicion of non-homogeneity. It was not possible to investigate the blood donors further, but patients were grouped according to origin north or south of the river Polur which lies between Karigiri and Vellore. Karigiri is in the northern area, whereas Vellore is just south

of the river. A significant difference is found between north and south (For O:B $X_1^2=5\cdot1$; $P>0\cdot025$.) (Table 4).

The majority of blood donors were between 18 and 30 years of age whereas the leprosy patients included a much wider range of ages. There is no overall heterogeneity in the blood groups of patients at different ages (Table 5), but in those patients furthest from the age of the donors, i.e. over 44, there is some suggestion of an increase in the frequency of group O ($X_1^2=4\cdot5$; $P>0\cdot05$). It was noticed that the clinics held in villages and on the roadside in the northern area contained 89 people over 44 years old out of a total of 256, compared with 100 out of 689 from other sources.

TABLE 1

Blood group	Leprosy Patients		Donors 1964		Donors 1962	
	No.	%	No.	%	No.	%
A	219	20·5	162	21·4	214	21·4
B	359	33·6	260	34·3	331	33·1
O	440	41·4	282	38·0	397	39·7
AB	46	4·4	51	6·6	58	5·8

TABLE 2

Blood group	Male	Female
A	144	75
B	223	82
O	288	125
AB	26	19
Heterogeneity $X_1^2=3\cdot6$; $P>0\cdot1$		
For O:B Ratio $X_1^2=1\cdot0$; $P>0\cdot1$		

TABLE 3

Blood group	Local leprosy patients	
	No.	%
A	158	18·5
B	263	33·0
O	350	43·5
AB	35	5·0
Total	806	

TABLE 4

Blood group	North		South	
	No.	%	No.	%
A	88	20·4	70	18·7
B	132	30·6	131	34·9
O	201	46·7	149	39·8
AB	10	2·3	25	6·3

TABLE 5

Age group	A	B	O	AB
0–5	1	0	5	0
5–14	34	61	75	10
15–24	47	77	86	16
25–44	90	146	167	12
45+	38	51	93	7

TABLE 6

Blood group	Type of leprosy					
	Lepromatous		Dimorphous		Tuberculoid	
	No.	%	No.	%	No.	%
A	75	19·7	57	22·7	87	20·2
B	129	33·7	85	33·9	145	33·6
O	159	41·7	102	40·6	179	41·4
AB	19	4·9	7	2·8	20	4·6
Total	382	100·0	251	100·0	431	99·8

The distribution of ABO blood groups in the different types of leprosy is shown in Table 6; no difference in distribution is seen. In view of the possible heterogeneity previously shown, lepromatous and tuberculoid patients were paired according to origin north or south of the river and age group (child, adult or over 44). When all the patients in a group could not be paired, those to be discarded were selected by distributing them evenly within the chronological order of grouping. The results are shown in Table 7. No significant difference in distribution is seen ($X_3^2=2$; $P > 0·1$).

TABLE 7

Blood group	Type of leprosy	
	Lepromatous	Tuberculoid
A	44	54
B	77	85
O	113	93
AB	9	11

TABLE 8

Haptoglobin Type	Type of leprosy			Totals
	Lepromatous	Dimorphous	Tuberculoid	
2–2	98	31	75	204
2–1	21	6	13	40
1–1	1	1	2	4
Negative	13	8	12	33
Totals	133	46	102	281

All transferrins tested were of the type C-C, except for one possible type C-D. The haptoglobin frequencies of the leprosy patients are shown in Table 8. The number of negatives is unusually high; ignoring the negatives, calculation of the gene frequencies gives Hp.1. 0·1; Hp.2. 0·9. No difference is seen with different types of leprosy.

DISCUSSION

This study does not support the hypothesis of an association of leprosy with blood group O. In this we are in agreement with most recent work (Beiguelman, 1963/1964; Yankah, 1965; Verma & Dongre, 1965). There is however a suggestion of geographical variation in the blood group distribution in the area studied, with a higher group O near Karigiri than near Vellore. The possible age effect is probably the result of more old people in the clinics of the northern area, or it could be the result of the differential migration of different genetic populations. It was not possible to record the three language groups or the social grades to which patients belonged, so that the primary cause for the differences in the distribution is a matter for speculation. However it seems probable that this geographical variation was the cause of the apparent association of leprosy with group O found by Hsuen working exclusively at Karigiri.

The overall distribution of ABO blood groups does not vary with the type of disease. In this respect the present study is at variance with the

findings of Beiguelman (1963) and Yankah (1965) who have found that group O appears to be increased in tuberculoid leprosy and decreased in lepromatous leprosy. However this association has not been found in other studies (Lowe, 1942; Verma & Dongre, 1965).

The frequencies of transferrins and haptoglobins are in close agreement with previous work on Tamil populations (Steinberg, Lai, Vos, Bhagwan Singh & Linn, 1961). However the high number of negative haptoglobins (11%) have not been satisfactorily explained. Previous studies on Indian populations have shown about 2 per cent negative haptoglobins.

SUMMARY

1. No evidence of a correlation between leprosy and ABO blood groups, transferrins or haptoglobins was found.

2. A high percentage of haptoglobin negatives were found in the population studied.

3. No association was found between particular blood groups and types of leprosy.

4. The apparent association of leprosy with blood group O found by Hsuen (1963) may have been due to difference in area of origin and age between the leprosy patients and the blood donors.

ACKNOWLEDGEMENTS

We should like to thank the many people who have helped in the various parts of the work, especially Dr Mourant, Dr Spickett, Dr Garlick, Dr Cochrane and Dr Harman for their guidance and technical assistance. We should also like to thank the staff of the Christian Medical College, Vellore, the Schieffelin Leprosy Research Sanatorium, Karigiri, and Vadathorasalaur Hospital for their help. We gratefully acknowledge the financial support of the Medical Research Council, The Sembal Trust, The British Leprosy Relief Association and The the Leprosy Mission.

REFERENCES

BEIGUELMAN, B. (1963). Grupos sanguineos e lepra. *Revta. leprol. Braz.* **31,** 34—44.

— (1964). Systema ABO e epidemiologia de lepra. *Revta. Paul. Med.* **65,** 80—86.

HSUEN, J., THOMAS, E., and JESUDIAN, G. (1963). Blood groups and leprosy. *Lep. Rev.* **34,** 143—147.

LOWE, J. (1942). Leprosy and blood groups. *Lep. in India* **14,** 23—25.

STEINBERG, A. C., LAI, L. Y. C., VOS, G. H., BHAGWAN SINGH, R. and LINN, T. W. (1961). Genetic and population studies of blood types and serum factors among Indians and Chinese from Malaya. *Am. J. Hum. Gen.* **13,** 355—375.

VERMA, B. S. and DONGRE, A. V. (1965). Blood groups and leprosy. *Lep. Rev.* **36** p. 211

YANKAH, J. A. K. (1965). Observations on the frequencies of ABO and Rh in leprous and non-leprous persons in Ghana. *Lep. Rev.* **36,** 73—74.