Prevalence of Abnormal Haemoglobins in Pulmonary Tuberculosis in Three Different Ethnic Groups

N. SAHA

From the Department of Physiology, Faculty of Medicine, University of Singapore, Singapore 3

There is evidence from the study of twins (Lenz, 1963; Carter, 1969) of a genetic predisposition to certain diseases, in particular pulmonary tuberculosis. But there are apparently no published reports of an association of pulmonary tuberculosis and ABO-Rh blood groups, haemoglobin, and immunoglobulin types. Saha and Banerjee (1968) could not establish an association between ABO-Rh blood groups and the presence of pulmonary tuberculosis, though there was a lower incidence of O group persons among Chinese patients. No relation was found between pulmonary tuberculosis and glucose-6-phosphate dehydrogenase deficiency in any of the three ethnic groups studied (Saha, 1969).

The results of these observations prompted the use of another genetic marker, namely abnormal haemoglobin gene, to study the genetic predisposition to pulmonary tuberculosis. Inquiries have been made in the past by other workers into a possible association of A-S and A-C traits with pulmonary tuberculosis, but the results were inconclusive (Table I). In most of the studies the numbers of patients were too few to provide acceptable information, and in none of these studies were different ethnic groups investigated along with simultaneous investigation of controls. Inquiries on different ethnic groups are needed

because of the possibility that a racial factor over and above common genetic predisposition may produce variability in susceptibility to disease.

It was thought worth while to study the association of haemoglobin mutant gene in three different ethnic groups in an attempt to discover whether this genetic mutant and racial type indicate predisposition to the development of pulmonary tuberculosis.

Materials and Methods

The subjects were confirmed cases of pulmonary tuberculosis comprising 1963 Chinese, 181 Malays, and 100 Indians. These patients, who were adults of both sexes, were attending the Singapore Anti-Tuberculosis Association (SATA) clinic for treatment. For comparison, 1453 healthy adults of both sexes of the same age-group as the patients, comprising 1102 Chinese, 308 Malays, and 43 Indians, were also investigated. These healthy subjects were attending SATA for routine clinical, radiological, and haematological examinations.

Details of the method of collecting blood have been given elsewhere (Saha, 1969). Red cells were washed three times with 0.9% sodium chloride solution, haemolysed with a volume of distilled water equal to that of the packed cell volume; half this volume of toluene was then added to the haemolysed solution. After vigorous shaking for 10 minutes, the mixture was centrifuged at 3000 r.p.m. for half an hour to give a clear haemolysate at the bottom. Haemoglobin types were separated by paper electrophoresis at 250 volts for 8 hours at 8–10° C.

TABLE I
INCIDENCE OF ABNORMAL HAEMOGLOBINS IN PULMONARY TUBERCULOSIS

Series	No. of Patients	No. with Abnormal Haemoglobins	Genotype	Control (%)
Dolgopel and Stitt (1929)	77	4 (5.2%)	AS	6.5
Weiss and Stecher (1952)	150	19 (12.6%)	AS	5.3
Rosenblum <i>et al.</i> (1955)	200	15 (7.5%)	AS	8.0
Ryan <i>et al.</i> (1960)	310	28 (9.0%)	AS	6.7
Coulter (1965)	220	8 (4.0%)	AC	1.5-3
Kher and Grover (1969)	100	0	AS	—
Present study	2244	16 (0.71%)	AE, AD, and AH	1.79

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