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Circulating Immunoglobulin Levels in Pulmonary Tuberculosis Patients

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ABSTRACT Serum immunoglobulin (G, A and M) levels were quantitatively determined in Indian patients with pulmonary tuberculosis. They were compared with those of controls. Mean levels of Ig G and Ig A were significantly raised in patients. On comparing the serum immunoglobulin values amongst the subgroups of pulmonary tuberculosis it was observed that Ig G level increased with severity of disease. No bisexual variation was observed with regard to Ig levels among controls.

INTRODUCTION

Association between immunoglobulin level and several diseases has already been well established (Claman and Merrill, 1966; Cohen et al., 1961; Daniele et al., 1980; Fahey, 1965; Jha et al., 1971 and Steihm and Fudenberg, 1966). Tuberculosis is the most important communicable disease in India. Pulmonary tuberculosis is the most common among the different types of tuberculosis.

The objective of the present study is to find out the circulating levels of immunoglobulins Ig G, Ig A and Ig M in patients with pulmonary tuberculosis, and the role of the immunoglobulins in the serological diagnosis of pulmonary tuberculosis, if any. This paper also investigates whether there is any correlation between circulating antibodies and the clinical status of the pulmonary tuberculosis patients. The present study also aims to find out whether there is any difference between sexes with regard to immunoglobulin levels.

MATERIALS AND METHODS

Fifty radiologically and bacteriologically confirmed pulmonary tuberculosis patients aged 14 to 60 years, who attended the Tuberculosis and Infectious Diseases Hospital, Visakhapatnam, during the period between February and April 1990, formed the material for this study. These were compared with 30 normal age and sex matched individuals from the same region who constituted the control group. Out of 50 patients, 39 were males and 11 females. The immunoglobulin concentrations were not estimated for those healed with pulmonary tuberculosis, but only patients who were on treatment were tested. The patients were divided into 3 subgroups with the help of X-rays; minimal comprising 3 patients, moderately advanced 23 patients and far advanced 24 patients. As there were only 3 patients in the minimal subgroup, they were considered along with the moderately advanced subgroup for analytical purpose.

Estimation of immunoglobulins, Ig G, Ig A and Ig M was made using commercially available Tripartigen immunodiffusion plates supplied by Hoechst India Limited, Bombay.

Results were expressed as the mean and standard error of mean. As the value is quantitative and distribution is of nongaussian type F test is used instead of t test.

RESULTS AND DISCUSSION

The immunoglobulin levels in pulmonary tuberculosis patients and controls are given in table 1. Standard deviation of immunoglobulin level in each class shows that the individual variation was large both in patients and controls. The levels of Ig G and Ig A were significantly elevated whereas those of Ig M were found to lie within the normal range of values. Our findings agree with those of previous studies (Buckley and Dorsey, 1970a; Faulkner et al., 1967; Gatner et al., 1982; Grange et al., 1980; Jha et al., 1974; Kardjito and Grange, 1980 and Papiha et al., 1985). Whereas some workers found a significant increase in Ig A alone (Bhatnagar et al., 1977; Skvor et al., 1979; Nash, 1979) observed a significant increase in Ig G alone. Further our results differ from 3 of the previous studies (Alarcon- Segovia and Fishbein, 1971; Al Tawil and Thewaini, 1978 and Malomo et al., 1970), in which a significant increase of all the 3 immunoglobulins was observed. However, these studies suggest that the significant increase in Ig M might be due to the fact of inclusion of patients in the early stages of infection where Ig M plays a significant role in humoral defence.

Table 1: Immunoglobulin levels in pulmonary tuberculosis patients and controls

	Patients	*Controls*	*F value*
Ig G mg/dl	3073±243 (1717)	1889±106 (580)	13.02*
Ig A mg/dl	519±55 (386)	211±22 (118)	17.35*
Ig M mg/dl	247±14 (98)	250±24 (131)	0.005

Mean ± Standard error of mean are given
Numbers in parentheses, represent standard deviation
*Statistically significant

Raised Ig G and Ig A levels in patients represent a nonspecfic response to mycobacterial antigens and have no diagnostic value. However, this involvement of immunoglobulin clearly indicates the role of humoral response in defence against M. tuberculosis infection. These elevated immunoglobulin levels tend to normalise with successful therapy.

Adult immunoglobulin levels might be in general influenced both by genetic and environmental factors (Al-Agidi, 1980; Allansmith et al., 1969; and Grundbacher, 1974; Kalff and Hijmans, 1969; and Rowe et al., 1968). Several other workers (Bronttie-Stewart et al., 1961; Buckley and Dorsey, 1970b; Butterworth et al., 1967; Comens, 1957; Goldstein et al., 1969; Grundbacher, 1972; Keltz and Comstock, 1959 and Rhodes et al., 1969) found that normal serum immunoglobulin levels are affected by age, sex, race and socio-economic status. So, before studying variation in immunoglobulin levels in disease, normal values in a particular area may be attempted.

The mean immunoglobulin levels in the subgroups of pulmonary tuberculosis patients are given in table 2. Increase of immunoglobulin levels was observed with increasing severity of disease. On comparing the different classes of immunoglobulin values amongst the subgroups of pulmonary tuberculosis a significant difference was observed only for Ig G. Thus with the increase in the severity of the disease there is a clearcut increase in Ig G level. There is no marked difference in Ig A and Ig M level.

Table 2: Immunoglobulin levels in subgroups of pulmonary tuberculosis patients and controls

	Moderately advanced+		*Far advanced*		*F-value*
	Mean	*S.D.*	*Mean*	*S.D.*	
Ig G mg/dl	2290	(469)	3921	(2126)	13.95*
Ig A mg/dl	432	(321)	612	(426)	2.72
Ig M mg/dl	237	(97)	259	(99)	0.64

+Includes 3 patients of minimal type
S.D. Standard deviation
* Statistically significant

Table 3 shows the immunoglobulin levels in male and female of control series. No significant difference was observed between males and females with respect to Ig G, Ig A

or Ig M. Higher levels of Ig M in females when compared with males has been reported by others (Butterworth et al., 1967; Grundbacher, 1972; Rhodes et al., 1969 and McGue et al., 1990).

Table 3: Bisexual variation of immunoglobulin levels in control series

	Male	*Female*	*F-value*
Ig G mg/dl	1790±126 (591)	2161±95 (446)	2.43
Ig A mg/dl	203±13 (63)	232±43 (201)	0.35
Ig M mg/dl	246±31 (144)	261±18 (84)	0.08

Mean ± Standard error of mean are given
Numbers in parentheses represent standard deviation

Rhodes et al. (1969) suggested that Ig M levels are influenced by the number of X-chromosomes. Further Grundbacher (1972) also contend that the X-chromosome of man carries genes with an effect on Ig M concentration, resulting into higher Ig M values in females than in males. However McGue et al. (1990) from their work argue against a major X-linked determinant, they suggest the possible role of sex-specific factors modifying the regulation of Ig M levels.

However, in the present study, similar observation could not be reached in control series, probably owing to relatively small number of females, among them.

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