

ORIGINAL ARTICLE

STUDIES ON THE PREVALENCE OF BLOOD GROUPS IN RELATION TO TUBERCULOSIS

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ABSTRACT

The present study is focused to assess the biology of mycobacterium tuberculosis and prevalence of blood groups in relation to the disease tuberculosis. Tuberculosis is caused due to infection with the mycobacterium tuberculosis, but everyone, who gets contaminated with the germ, does not get the disease. Most of the time, the immune system can prevent you from becoming sick and only about 10% of people infected with tuberculosis go to on to develop tuberculosis. The symptoms of tuberculosis do not become evident in most cases, unless the disease has advanced. Survey of tuberculosis infected persons of outpatient at the District Head quarters Government General Hospital, Cuddalore. It has been estimated to determine the blood groups of about 384 persons with the tuberculosis infected persons. The ABO blood grouping and the Rhesus typing were performed in the Clinical laboratory, District Head quarters Government General Hospital, by the standard slide agglutination reaction by using a commercial kit of Antiserums A, B, O [SPAN Diagnostics Ltd, India] for all the study subjects as well as the control individuals. The present study shows that a significant effect in the prevalence of blood group related to tuberculosis. 384 samples were collected and out of which 284 male cases and 100 female cases. Prevalence of blood group with total collected population shows that 'O' groups is more prevalent and recorded 148 cases out of 384 cases. Other groups 'A' blood group 60 cases and 'AB' blood group 40 cases out of 384. Least prevalence also noted that the 'AB' blood group 40 cases out of 384 cases. The most important positive finding which emerges from the present study is the suggestion of an ABO blood group association in pulmonary tuberculosis characterized by an increased incidence of the disorder in persons of blood type B and a decreased incidence in those of blood type AB. The results of the family studies in the present investigation provide no evidence of the ABO blood grouping in the hereditary aspects of pulmonary tuberculosis.

Keywords: Tuberculosis - *Mycobacterium tuberculosis* - prevalence - blood groups

1. INTRODUCTION

Tuberculosis is caused due to infection with the mycobacterium tuberculosis, but everyone, who gets contaminated with the germ, does not get the disease. Most of the time, the immune system can prevent you from becoming sick and only about 10% of people infected with tuberculosis go to on to develop tuberculosis. The symptoms of tuberculosis do not become evident in most cases, unless the disease has advanced.

The common symptoms of tuberculosis include cough for a prolonged duration that is more than three weeks, unexplained or intended weight loss, fatigue, general feeling of tiredness, fever, sweating at night, chills and loss of appetite. Having these signs and symptoms does not mean that you have tuberculosis. There are many other diseases which have the same symptoms. So you need to undergo

various tests, so that you are sure that you have tuberculosis. Signs and symptoms of active tuberculosis may also vary depending on the organ that is affected. Most of the times, the lungs of the patients are affected. Symptoms of tuberculosis of the lungs include cough for three or more weeks, blood in cough, chest pain or pain while breathing or coughing. Tuberculosis can also affect organs apart from the lungs. The other organs that are affected by tuberculosis include lymph nodes, genitourinary nodes, bone and joint sites, lining covering the outside of the gastrointestinal tract. Numerous studies which have been done in the past have shown that there was an association between pulmonary tuberculosis and the ABO blood group systems (Saha and Banerjee 1968).

India, a country with over 1.21 billion people, has the highest burden of tuberculosis (TB) in the world, accounting for 20% of the global incidence of TB, and an even higher share of

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global incidence of multi-drug resistant (MDR) TB (Laha and Dutta 1963).

Despite this success, India continues to have an estimated annual incidence of more than 2 million TB cases. While the problem of TB in India is characterized by high incidence, high prevalence, and high rate of transmission of TB infection (Shenoy and Daftery 1962).

After the pioneer work of Aird et al (1953) many workers have tried to correlate the Susceptibility of various diseases in relation to blood groups (Aird et al 1954, Walther et al 1956, Fraser Roberts 1957, Tyagi et al 1965, 1966 and 1967). The incidence of ABO blood groups in pulmonary tuberculosis has been reviewed by different authors but with conflicting reports (Campbell 1956, Kothare 1964, Shenoy and Daftery 1962, Laha and Datta 1963, Jain 1970 and Thamaria et al 1972).

Therefore, a study was undertaken to assess any genetic relationship of ABO and Rhesus blood groups and secretion of blood group specific substances in saliva in cases of pulmonary tuberculosis. Relationship of ABO and Rhesus blood groups with the extent and nature of the disease is presented herewith. The present study is focused to assess the biology of mycobacterium tuberculosis and prevalence of blood groups in relation to the disease tuberculosis.

2.MATERIALS AND METHODS

Study Design and Setting

Survey of tuberculosis infected persons of out patient at the District Head quarters Government General Hospital, Cuddalore. It has been estimated to determine the blood groups of about 384 persons with the tuberculosis infected persons. Epidemiological studies have been carried out in the Cuddalore district on tuberculosis by adopting questionnaire. The data were analyzed with the SPSS package. It is proposed to collect data periodically every weekend. Sputum and blood samples were collected and immediately get into process of slide preparation and blood group analysis respectively

The patients distribution of the ABO blood group and the Rhesus antigen/factor was investigated in the patients who attended the TB and Chest Department at the District Head quarters Government General Hospital, Cuddalore, Tamil Nadu, India. A total of 320 patients with a clinical and a radiological evidence of pulmonary tuberculosis were included in the present study.

Microbiological Investigation

Sputum samples were collected from each patient and they were investigated in the Clinical laboratory, District Head quarters Government General Hospital for the presence of acid fast bacilli. The standard method of acid fast staining was followed for microscopy and the reporting was carried out as per the recommended protocols. The sputum specimens were subjected to culture in case the sputum was negative for acid fast bacilli by direct smear microscopy. The samples were inoculated onto the LJ medium (*Hi-Media, India*) and the media plates were incubated at 37°C. The

growth was checked up to 14 days. The reporting was done with a reference to the standard strain (*ATTC H37Rv*).

Acid Fast Bacilli staining

Clean and labeled slides were used for the smear preparation. Yellowish portion of the sputum was taken and spread about 2 X 1cm in the slide. The sputum smeared slide was then kept for 10 minutes for drying. Such as air dried slide was heated with flame for fixation. The slides were prepared for both positive and negative (control). Freshly prepared carbol fuchsin stain was poured over the smeared sputum for five minutes. Then, the carbol fuchsin stained slide was washed with water. Excess stained was decolorised with acetone for three minutes. The slide was thoroughly and counter stain methylene blue was poured and allowed for 1minutes. Then the slide was washed with water and air dried and observation was made with oil immersion objectives in the microscope.

ABO Blood Grouping and Rh Typing

The ABO blood grouping and the Rhesus typing were performed in the Clinical laboratory, District Head quarters Government General Hospital, by the standard slide agglutination reaction by using a commercial kit of Antiserums A, B, O [SPAN Diagnostics Ltd, India] for all the study subjects as well as the control individuals.

Statistical Analysis

The statistical significance was calculated by using *the SPSS software package* 384 cases of pulmonary tuberculosis having positive sputum for acid fast bacilli were examined for ABO and Rhesus blood grouping. These cases were collected from the patients attending the outpatient section of Tuberculosis and Chest Diseases, Tuberculosis Centre, Clinical laboratory, District Head quarters Government General Hospital, Cuddalore. All raw data were assembled and analyzed. Pulmonary tuberculosis prevalence of blood group frequencies were compared using a chi-squared test for 2-by-2 contingency tables in Excel and SPSS software ($P < 0.05$ considered statistically significant).

3.RESULTS

Tuberculosis in The Collected Samples

The present study shows that a significant effect in the prevalence of blood group related to tuberculosis. 384 samples were collected and out of which 284 male cases and 100 female cases.

Prevalence of blood group with total collected population shows that 'O' groups is more prevalent and recorded 148 cases out of 384 cases. Other groups 'A' blood group 60 cases and 'AB' blood group 40 cases out of 384. Least prevalence also noted that the 'AB' blood group 40 cases out of 384 cases. The variations were shown in Graph 1

Tuberculosis in the male population

The present study shows that a significant effect in the prevalence of blood group related to tuberculosis in the male population. Prevalence of blood groups with male population shows that 'O' group is more prevalent and recorded 104 out of 284 cases. Other groups are 'A' group 52 cases, 'B' group

92 cases, and 'AB' group 36 cases out of 284. Least prevalence is also noted that the 'AB' group 36 cases out of 284 cases (Graph 2).

prevalence is also noted that the 'AB' group 4 cases out of 100 cases as shown in Graph 3.

Symptoms analysis of Tuberculosis persons

Symptoms analysis of Tuberculosis persons were done from the Patients based on a questionnaire. The reports were statistically analysed. The reports of the response were not common in all cases. Particularly a common symptoms were notice that weakend immune system is one of the causative symptom of tuberculosis eventhough they had BCG vaccinated.

Whereas unexplained weight loss, night sweating, persistant fever and hoarseness are consider to be the symptoms of TB (significant level at 10%) (Graph 4). Persistant cough and unrxplained tiredness are unique features of TB. Family pedigree analysis inquires reveals that the disease TB is no way connected to the hereditary aspects but it is acquired that is transmittable.

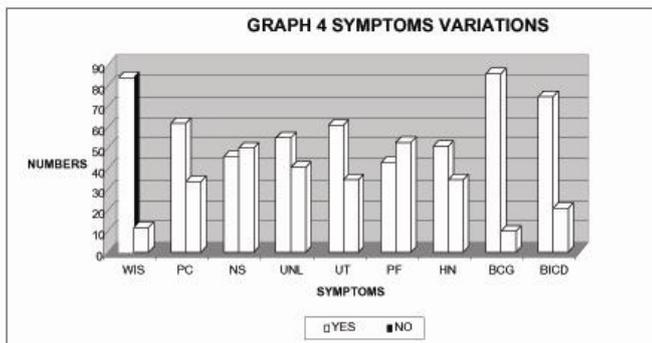
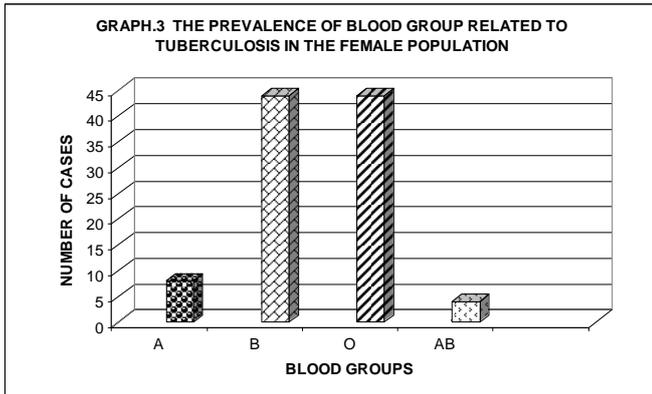
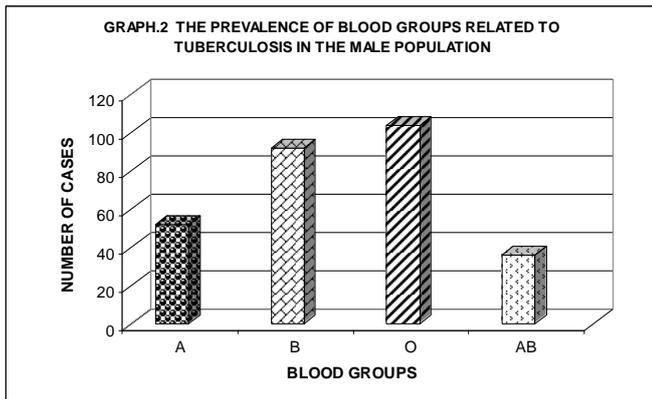
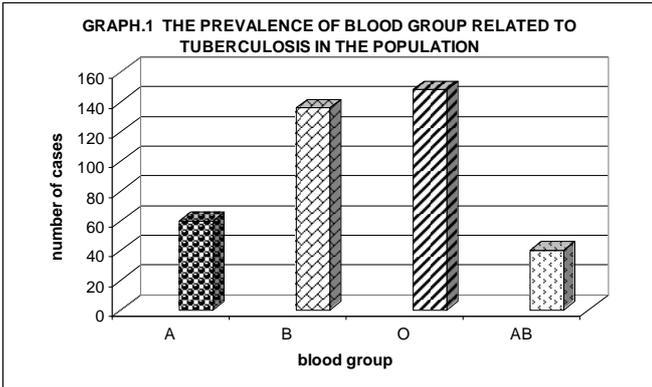
4.DISCUSSION

Tuberculosis is caused due to infection with the mycobacterium tuberculosis, but everyone, who gets contaminated with the germ, does not get the disease. Most of the time, the immune system can prevent you from becoming sick and only about 10% of people infected with tuberculosis go to on to develop tuberculosis. The symptoms of tuberculosis do not become evident in most cases, unless the disease has advanced.

The data on association between the distribution of the ABO blood types and diseases is conflicting, some studies reporting no association and others showed positive association. Despite the fact that the association of blood groups with certain diseases is clearly demonstrated, and the evidence that blood groups may play an important role in certain diseases, for example, peptic ulcer and gastric cancer (Arid ,1953), However, there is evidence of positive association as well. In present investigation, the prevalence of blood groups related to tuberculosis shows that the O blood group is more associated with the tuberculosis. Whereas the other blood groups A and B shows moderately infected with the tuberculosis. It may be due the multiple allelic nature of the blood character. It means that the co-dominant effect of genes

In the present study, there was a positive association between A and O blood groups and tuberculosis ($P < 0.05$), with both groups being less common in the tuberculosis group. However, a larger sample study will be needed in these aspects in different racial groups to verify our findings. Our results are interesting in terms of the positive association of A and O groups with tuberculosis, which seem to have protective effect. However, it is premature to make any etiological conclusions from the study unless a large sample study is being conducted.

Qureshi *et al* (2008) demonstrated that tuberculosis and ABO blood groups are interrelated; they found that among 70 patients with tuberculosis, blood group B was more common and represented 35.71% compared to that of control, which



Tuberculosis in the female population

The present study shows that a significant effect in the prevalence of blood group related to tuberculosis in the female population. Prevalence of blood group with female population shows that 'O' group is more prevalent and recorded 44 out of 100 cases. Other groups 'A' group 8 cases, 'AB' group 4 cases out of 100 cases. 'B' and 'O' blood groups are similar in 44 cases out of 100 cases. Least

represented only 22.14% of the sample population, but statistical significance was not achieved ($P>0.05$).

It is interesting to note that our study did show a higher percentage of blood group B in the diabetic group, but this failed to achieve statistical significance, and results are in agreement with Qureshi *et al* (2008). Moreover, Qureshi *et al* (2008) found that O and A blood groups appear to be more frequent in healthy controls (39.28 and 25%) compared to patients with tuberculosis (34.28 and 15.71%), but this as well was not statistically significant. In addition, ABO blood group distribution had statistical significance among races in the controls but was non-significant in patients, and the same was true for gender, i.e., no statistical significance.

In the present study, blood group B was prevalent at a high percentage among patients with tuberculosis – 35.71% in comparison to that of controls, 22.52%, but there was no statistically significant difference ($P>0.05$). It is concluded that there was an association between blood groups A and O and tuberculosis, and the association was negative as these groups were less common in tuberculosis and seems to be protective from the disease. Large studies in other ethnic groups are needed to confirm these results.

The purpose of this study was to find out the association between different ABO blood groups and tuberculosis. Results of this study showed no significant association between Blood Groups and tuberculosis. An increase in the frequency of group B (8.20%) and a decrease in groups A, O and AB (1.59%, 3.7% and 2.9% respectively) was observed in Table I. Statistically this difference in the frequency of ABO blood groups was found to be significant as the calculated value (18.7) of χ^2 (chi-square) was greater than the tabulated value ($\chi^2_{5\%}=7.815$, D.F.=3). So it was concluded that blood groups A, B, O and AB are heterogeneous as far as the proportion of the cases of pulmonary tuberculosis is concerned. Thus it was observed that there was preponderance of group B in cases of pulmonary tuberculosis in the present study. Reports in the literature have shown a great variation in the frequency of ABO blood groups in pulmonary tuberculosis. Thamaria *et al* (1972) while studying the ABO frequency in 118 bacillary pulmonary tuberculosis cases reported a high preponderance of group O. . It has been confirmed from these findings, in the present study Blood group O is more prevalent and the AB blood group least Prevalent to pulmonary tuberculosis. however, failed to get any significant variation in the frequency of blood groups in relation to the rate of inactivation of isoniazid. Gupta and Gupta (1966) and Jain (1970) mentioned a higher frequency of group AB in pulmonary tuberculosis cases.

Numerous studies which have been done in the past have shown that there was an association between pulmonary tuberculosis and the ABO blood group systems (Campbell (1956), Kothare (1959), Shenoy and Daftary (1962) and Nath *et al* (1963). In the present investigation, in the present investigation, the male population acquired more cases with pulmonary tuberculosis compare to the females in all the blood group and statistically significant, it may be due to over weight and obesity in females resulting lesser prevalence to pulmonary tuberculosis compare to males.

The most important positive finding which emerges from the present study is the suggestion of an ABO blood group association in pulmonary tuberculosis characterized by an increased incidence of the disorder in persons of blood type B and a decreased incidence in those of blood type AB. These

findings, although of some statistical significance, suggest only tentatively a blood group association and should be cautiously interpreted. Caution is in order in view of the conflicting findings of others. The results of the family studies in the present investigation provide no evidence of the ABO blood grouping in the hereditary aspects of pulmonary tuberculosis.

Symptoms analysis of Tuberculosis persons were done from the Patients based on a questionnaire. The reports were statistically analysed. The reports of the response were not common in all cases. Particularly a common symptoms were notice that weakend immune system is one of the causative symptom of tuberculosis eventhough they had BCG vaccinated. Whereas unexplained weight loss, night sweating, persistant fever and hoarseness are consider to be the symptoms of TB (significant level at 10%). Persistant cough and unrxplained tiredness are unique features of TB. Family pedigree analysis inquires reveals that the disease TB is no way connected to the hereditary aspects but it is acquired that is transmittable. It is confirmed from the earlier findins of (Campbell 1956, Kothare 1959, Shenoy and Daftary 1962, Laha and Datta 1963, Jain 1970 and Thamaria *et al* 1972).

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