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Association of blood group antigens with filariasis

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Abstract

Many infectious diseases are found to be associated with the human blood group antigens. In this study an attempt was made to find out the relation between filarial infection and human blood group. About 58 microfilaraemic, 95 subjects with elephantiasis and 378 endemic normal subjects were examined for their association with blood group antigens. About 45% microfilaraemic subject were found to have AB and about 42% subjects with elephantiasis were found to have B blood group.

Keywords: microfilaraemic, elephantiasis, dehaemoglobinization, filariasis

Introduction

Occurrence of several communicable diseases has been found to be associated with human blood group antigens. Patients with blood group 'A' are more susceptible to a severe heptosplenic form of Schistosomiasis than those with blood group 'O' who developed only milder form of the disease^(1, 11). Intensity and annual incidence of *Schistosoma haematobium* infection and related organ pathology was significantly higher among children of blood group 'A' and lower among blood group 'O'. Similarly, intensity and incidence of *S. mansoni* infection and related liver lesions were high among children of blood group 'A'⁽⁹⁾. Children with 'O' group were found to be more affected by malaria in Nigeria⁽⁷⁾. Similar observations were earlier reported in case of adults in Nigeria⁽¹⁹⁾. In case of falciparum malaria in India it was found that patients having blood group 'A' were more susceptible to infection compared to blood group 'O'⁽¹⁹⁾. There have been controversial reports regarding the association of blood groups with lymphatic filariasis^(12, 13). It was reported as early as 1946 that persons with blood group 'A' are more susceptible to filarial infection as compared to persons of other blood groups⁽²⁾. During study on Timorian filariasis it was reported that the prevalence of mf is found to be higher in individuals with blood group 'A' and 'AB'⁽⁵⁾. It was observed that individuals of blood group 'B', when microfilaraemic, had a significantly higher probability of developing clinical filariasis⁽¹⁰⁾. However, persons with 'AB' blood group, when microfilaraemic had a significantly lower probability of developing clinical manifestations. In the present study, an attempt was made to find out the relationship, if any, between blood groups and incidence of microfilaraemia and/or elephantiasis.

1. Materials and methods

Informed oral consent was obtained from all the subjects who participated in this study. This study was done under supervision of registered medical practitioner.

2.1 Detection of microfilariae

Finger prick blood samples each of 20 µl were collected between 21:00 to 23:00 and thick smears were made for parasitological examination. The dried smears were taken to the laboratory and stained with Giemsa following dehaemoglobinization. The slides were rinsed briefly in tap water to remove excess stain and dried. The stained slides were examined under microscope with magnification of 100x. Two smears were collected from each subject and mean mf count was recorded.

2.2 Clinical filariasis

All the subjects were examined for clinical manifestations and those which established elephantiasis were only included in the study.

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2.3 Determination of blood group antigens

About 58 microfilaraemic subjects and 95 subjects with clinical manifestations and 378 endemic normal subjects were examined for their association with blood group antigens. Blood group antigens were determined by latex agglutination test employing monoclonal antibodies (Stanclone, Monoclonal antibodies, Hyderabad) against red cell A and B antigens. Fresh blood was taken on a microscopic slide and a drop of anti-red cell antigens (A or B) was added separately and mixed with the help of a needle. The slide was observed for agglutination under microscope.

3. Results

Blood group antigens of three groups of subjects viz., normal, microfilaraemic and clinical filariasis were examined to find out the association, if exists, between blood group antigens and filarial infection. Of the 378 subjects from normal population, 40.74% belong to 'O' blood group followed by 'B' (33.33%) and 'A' (15.61%). Only 10.32% of normal subjects in the study region expressed 'AB' antigens. Of the total 153 filarial subjects examined for their blood antigens, 35.29% subjects were found with 'B' group followed by 'O' group (21.57%), 'AB' group (22.22%) and 'A' group (20.92%). There was no variation amongst male and female subjects and they conformed to the total distribution (Table 1).

Table 1: Distribution of blood group antigens among normal and infected subjects.

Blood group	Normal			Infected		
	Male	Female	Total	Male	Female	Total
A	32 (14.48%)	27 (17.20%)	59 (15.61%)	11 (21.15%)	21 (20.79%)	32 (20.92%)
B	75 (33.94%)	51 (32.48%)	126 (33.33%)	19 (36.54%)	35 (34.65%)	54 (35.29%)
AB	24 (10.86%)	15 (9.55%)	39 (10.32%)	12 (23.08%)	22 (21.78%)	34 (22.22%)
O	90 (40.72%)	64 (40.76%)	154 (40.74%)	10 (19.23%)	23 (22.77%)	33 (21.57%)
Total	221	157	378	52	101	153

Out of 58 microfilaraemic subjects examined, 44.83% were found to have 'AB' group antigens, 24.14% had 'B' group antigen, 17.24% had 'A' and 13.79% had 'O' blood group (Table2; Fig.1). A gender variation is associated with B and AB blood group antigens. While 32% males were observed with B group, only 18.18% females were positive for B group. Among AB group, more females (48.48%) were observed as compared to males (40%).

Out of 95 elephantiasis subjects examined, 42.11% had 'B' blood group antigens, 26.32% had 'O' blood group antigen, 23.16% had 'A' blood group antigens and 8.42% had both 'AB' blood group antigen. Gender associated variation was observed in subjects with AB group. More females (8.82%) than males (8.42%) were noticed with clinical symptoms in AB group (table 2; fig. 1).

Table 2: Distribution of blood group antigens among microfilaraemic & elephantiasis subjects.

Blood group	Microfilaraemic			Elephantiasis		
	Male	Female	Total	Male	Female	Total
A	4 (16%)	6 (18.18%)	10 (17.24%)	7 (25.93%)	15 (22.06%)	22 (23.16%)
B	8 (32%)	6 (18.18%)	14 (24.14%)	11 (40.74%)	29 (42.65%)	40 (42.11%)
AB	10 (40%)	16 (48.48%)	26 (44.83%)	2 (7.41%)	6 (8.82%)	8 (8.42%)
O	3 (12%)	5 (15.15%)	8 (13.79%)	7 (25.93%)	18 (26.47%)	25 (26.32%)
Total	25	33	58	27	68	95

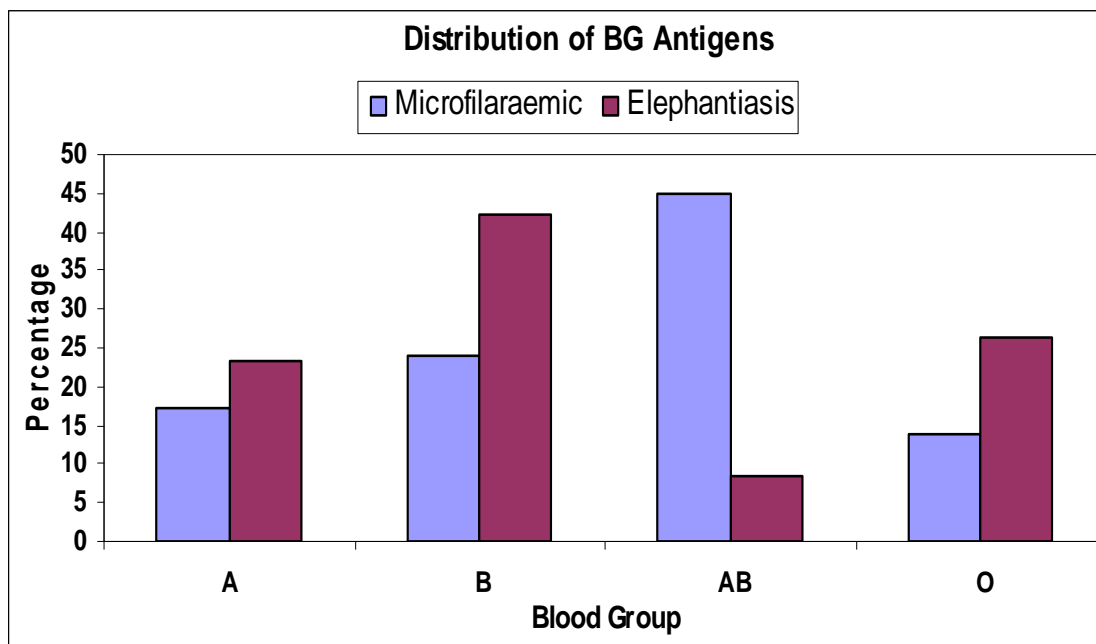


Fig 1: Distribution of blood group antigens among microfilaraemic & elephantiasis subjects.

4. Discussion

Very few people living in filarial endemic zones are susceptible to the bites of infected mosquitoes, while majority of the endemic population is resistant to filarial infection despite the fact that every person in a given set up is equally exposed to the bites of infected vectors. This is perhaps due to innate ability of the subjects to resist the infection, which in turn is attributed to variation in genetic factors among endemic community. Similarly, very few microfilaraemic subjects develop clinical manifestations in due course of time whilst majority of them remain microfilaraemic for years together and in some cases throughout the life without developing any visual manifestations. The genetic and immunologic factors that govern the course of infection in exposed subjects remain the priority topic of filarial research even today. An attempt has been made to study the frequency of major blood group antigens in subjects with bancroftian filariasis. A total of 531 subjects were examined for their association with blood group antigens. About 41% of normal healthy subjects expressed 'O' antigen followed by 'B' antigen (33%). A very low percentage (10.32%) of normal subjects expressed 'AB' antigens in the study region. In contrast, significantly high proportions (45%) of microfilaraemic subjects belong to 'AB' group. The prevalence of blood group antigens amongst microfilaraemic subjects is in order of AB>B>A>O. This observation suggests that subjects with 'AB' group living in Raipur region are at potential risk of acquiring filarial infection. About 24% of microfilaraemic subjects express 'B' antigen suggesting that endemic subjects with this group are at risk next only to those with AB group. The distribution of blood group antigens on subjects with elephantiasis reveal that microfilaraemic subjects with 'B' group are at greater risk of developing clinical manifestations and in particular 'elephantiasis' in due course of time. This group is followed by subjects with 'O' and 'A' antigens. The results also suggest that very low percentage (8.42%) of microfilaria carriers with AB group are prone to develop elephantiasis despite the fact that endemic subjects with this group are at potential risk of acquiring microfilaraemia than subjects with any other blood group. When analyzed as a single group (Carriers + elephantiasis subjects), 'B' group subjects are shown to at high risk of acquiring filarial infection followed by individuals with 'O', 'AB' and 'A' groups. The results of this study corroborate with the earlier observations found in Pondicherry⁽¹⁰⁾. They observed that mf carrier with 'B' group had significantly higher and those with 'AB' group had a significantly lower probability of developing clinical manifestations. Association between microfilaraemia and blood groups A and AB were observed in earlier studies at other parts of India^(12, 13). Contrary evidence does exist on the association between filariasis and the 'ABO' blood groups⁽⁶⁾. In this study, a statistically significant relationship exists between microfilaraemia and AB group antigens. The results thus suggest that in areas of filaria low endemicity like Raipur, preventive and prophylactic measures could selectively be targeted to the subjects of 'AB' group as this group is vulnerable to acquire microfilaraemia, The highest prevalence of 'B' group among elephantiasis subjects warrant special attention on microfilariae carriers with 'B' group as they are prone to develop clinical manifestations. It may be emphasized that the study was carried out in only urban

filarial zone of low endemicity and the result may or may not be applicable to filarial zones of other geographical regions with different degrees of endemicity. The mechanism of association between filariasis and ABO antigens needs to be explored to understand how the distributions of blood group antigens affect susceptibility/resistance to infection. It is not known yet, if there is any homology between blood group antigens and those expressed on filarial parasites or *Wolbachia*.

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