A demographic evaluation and blood group corelation of malaria at a tertiary care center

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Abstract

Introduction: The resurgence of malaria in the Indian subcontinent has become a major national health problem with a significant morbidity and mortality.[1,2] The knowledge of the factors that affect the susceptibility of the host can be an added advantage to effective predict and fore see the complications malaria.

Although the red blood cells are thought to be relatively inert, they contain hemoglobin, and have numerous surface molecules that play a very active in microbial attachment processes one of which are the ABO blood group antigens.

Materials and Methods: The present study was carried out at AJ institute of medical sciences of Mangalore, Dakshina Kannada district. The relevant clinical data in terms of demographic- age, sex, place, occupation and clinical history were obtained from the patient. Following this the patient underwent a detailed clinical examination and relevant investigations were conducted. Patients with or without fever and who are either

Results and Observations: In the present study we had 83.6% males and 16.4% females, the gender difference was statistically highly significant with a chi square test value $\chi 2$ =77.476.P=.000<0.001. Malaria was found to be most common in the 21-30 years of age group (52%) and less at the older age group those patients with malaria who were of the age 60 years and above P=.000<0.001, the commonest blood group in patients with malaria to be found was O positive with a value of 42% and the commonest malarial infection was vivax malaria that was seen in72.6% of the total malarial cases., Among complication seen was Acute respiratory distress syndrome comprising of 49.7%. Falciparum infected patients showed more number of disseminated intra- vascular coagulation cases (42.9%) whereas mixed malarial patients showed more number of acute renal failure cases (43.3%).

Conclusion: Complications were predominantly seen in blood group O positive blood group and in the male gender. Common complication was ARDS.The maximum number of severe cases of malaria was seen in patients with blood group O+.

Keywords: Glomerular filtration rate. Renal disease, CKD-EPI.

Introduction

The resurgence of malaria in the Indian subcontinent has become a major national health problem with a significant morbidity and mortality.[1,2]The knowledge of the factors that affect the susceptibility of the host can be an added advantage to effective predict and fore see the complications malaria.

Although the red blood cells are thought to be relatively inert, they contain haemoglobin, and have numerous surface molecules that play a very active in microbial attachment processes one of which are the ABO blood group antigens.[3,4]

There has been an increase in the evidence that the severity of malaria and its association with certain ABO blood groups. The identification of the ABO antigens as receptor or co-receptors responsible for invasion by the malaria parasite can be helpful in the antimalaria therapy.

The genetic make-up of an individual causes profound variation in the way they respond to the malarial infection are likely to indicate an individual's susceptibility.

In the district of Dakshina Kannada, malaria is very rampant and is considered as an endemic disease. In view of the above said we did a conduct a study on the relationship between the ABO blood groups and malarial infection in the district of Dakshina Kannada to see if any relationship exists between the A, B, O blood groups and malaria.

Materials and Methods

The present study was carried out at AJ institute of medical sciences of Mangalore, Dakshina Kannada district. The relevant clinical data in terms of demographic- age, sex, place, occupation and clinical history were obtained from the patient. Following this the patient underwent a detailed clinical examination and relevant investigations were conducted. Patients with or without fever and who are either smear positive for malaria parasite or positive for Becton-Dickinson's quantitative buffy coat II system were included. The study was conducted in a time frame of four years between January 2014 and December 2018. During this period a total of 3256 cases of malaria were seen of which only 1250 agreed to participate in the study and met the pre defined criteria set for the study. ABO blood grouping were done using the slide agglutination method. The correlation between the blood groups and malaria was studied.

1. Those who took anti - malarial drugs within two weeks prior to the blood sample collection
2. Non malarial fever.
3. Blood malignancies.
4. Chronic illnesses like Diabetes Mellitus, Rheumatoid Arthritis, Renal Failure.

The operational definitions that used were in the present study were as follows :-

Complicated malaria (World Health Organization criteria for complicated malaria).[5]

1. Impaired consciousness of the patient
2. Prostration and extreme weakness
3. Jaundice
4. Cerebral malaria
5. Generalized convulsions
6. Anemia that is normochromic in nature
7. Acute renal failure
8. Hypoglycemia
9. Fluid disturbances, electrolyte disturbance and acid base balance disturbances.
10. The presence of pulmonary oedema
11. algid malaria
12. Disseminated intra- vascular coagulation
13. Hyperparasitemia
14. Malarial haemoglobinuria

Mild Malaria: Acute febrile illness but no features of severe malaria.

Moderate Malaria: Did not fulfill the criteria needed for severe malaria.

Severe malaria: Those with cerebral malaria (in coma and unable to localize a painful stimulus). Fully conscious but either prostrated (unable to maintain a sitting posture) or in respiratory distress (abnormally deep breathing with intercostals or subcostal recession).[6]

Results and Observations

In the present study we had 83.6% males and 16.4% females, the gender difference was statistically highly significant with a chi square test value $\chi 2$ =77.476.P=.000<0.001. Malaria was found to be most common in the 21-30 years of age group (52%) and less at the older age group those patients with malaria who were of the age 60 years and above P=.000<0.001, the commonest blood group in patients with malaria to be found was O positive with a value of 42% and the commonest malarial infection was vivax malaria that was seen in72.6% of the total malarial cases. Falciparum cases were more in the blood group O positive (11.6%). Mixed infection was predominantly seen in patients with blood group A negative (33.3%).Maximum complications was seen in the age group of 21-30 years of age group (51.4%) whereas the least was seen in patients who were above 60 years (2.7%) %). Both Falciparum and mixed infections were commonly seen in the age group of 21-30 years with values of 9.2% and 18.3% respectively. More complications were seen among males (97.3%) than among females (2.7%). Chi square test, $\chi 2$ = 5.943P=.015, in both genders, females and males, Vivax malarial cases were more commonly seen (20.1% and 79.9% respectively). Whereas mixed infection was seen more among males (90.2%) than among females (5 patients 9.8%) which was highly significant. Chi square test, χ^2 = 10.708P=.005, Among complication seen was Acute respiratory distress syndrome comprising of 49.7%. Falciparum infected patients showed more number of Disseminated intra-vascular coagulation cases (42.9%) whereas mixed malarial patients showed more number of acute renal failure cases (43.3%).

Discussion

Malaria is a tropical diseases that is spread to the humans through the bite of the mosquito, a decade ago there was a declining trend in the prevalence of malaria, but the past few years there had been a slow increasing trend with increased morbidity.[6,7]

Though the disease is centuries old the exact pathogenesis of malaria is till date incompletely understood, but there is enough evidence to suggest that severe disease is related to the sequestration of those red blood cells that are affected by the malarial parasite in the vascular beds inside the various vital organs.

There are three forms that are attributed to cause human malaria Vivax malaria, mixed infection and Falciparum malaria. Vivax malaria is the commonest and the mildest as compared to its counterpart the falciparum malaria, though less common has a higher incidence of complications. An adhesion property that is found in some of the P. Falciparum isolates which has been associated with severe malaria is rosette formation. The rosetting refers to the occurrence of spontaneous binding of the uninfected red blood cells to red blood cells that are infected with nature sexual parasites. the plasmodia possess antigens equivalent to the blood group antigens A and B of man.

Gupta and Chowdhuri[8] found that 62.8% of their cases were in the age group 10-30 years; this is comparable with data from this study (61.6%). Tyagi S P [9] found blood group B to be the predominant blood group (37.21%) in his study of the distribution of blood groups in Uttar Pradesh. Chowdhuri et al[8] found blood group B to be predominant in their control baseline group (41.92%.), Blood group O positive was commonest in the study group (27.6%) i.e., Majority of the studies show that blood group A were found to have more complications This could be due to blood group A being a coreceptor in Plasmodium Falciparum rosetting as demonstrated by Barragan et al[10.] In terms of severity of malaria, blood group A was found to have the maximum numbers of cases (44.44%)

Martin et al[11] in their study found O blood group children to have the most number of severe cases.

Conclusion

Malaria is more common in Males, in the 21 – 30 year of age group, Vivax malaria was the commonest

infection in all blood groups, Falciparum cases and Complications were predominantly seen in blood group O positive blood group and in the male gender common complication was ARDS. The maximum number of severe cases of malaria was seen in patients with blood group O+.

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