Original Research Article

A study of blood group frequencies in malaria patients

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Received: 02-05-2021 / Revised: 01-06-2021 / Accepted: 03-07-2021

Abstract

Malaria is an endemic disease and claims many lives especially in tropical countries. Many studies have been reported where some specific blood groups were linked to the malaria. The frequencies were unknown. Many reports have been done to identify the intensities also. No such studies have been reported in the local population and our study is an effort to find the frequencies of malaria in particular blood groups. This study puts in a sincere effort to find the frequencies of malaria in different ABO blood groups. This is the step one of research and will be reported. Further varieties of malarial parasite and complications associated would be studied in the future and reported.

Keywords: Malaria, Blood group, Frequency.

Introduction

The resurgence of malaria is a major national health problem with considerable morbidity and mortality and has long been eluding our efforts for effective control. Knowledge of factors, which affects the susceptibility of the host, will be an added advantage in our efforts to control malaria. Although erythrocytes have traditionally been considered relative inert containers of haemoglobin, mounting evidence suggest that they in fact bear numerous surface molecules that are active in microbial attachment processes[1-5].. Various host receptors on the surface of the uninfected RBC have been proposed including ABO blood group antigens. The identification of the ABO antigens as receptor or co-receptors responsible for invasion by the malaria parasite brings in the possibility of receptor blockade for anti malaria therapy as a potential therapeutic tool.The genetic makeup of individuals may cause a considerable variation in their reaction to malarial infection and blood groups being an expression of genetic constitution are likely to indicate an individual's susceptibility.It was therefore thought worthwhile to conduct a study on the relationship between the ABO blood groups and malarial infection in our set up.

Aim of the Study

1. To establish whether there is a relationship between A, B, O blood groups and malaria.
2. To study the blood group frequencies in malaria patients.

Materials and Methods

The present study was carried out in Yenepoya Medical College Hospital after obtaining clearance from the Ethical Committee of the Hospital.

- Relevant clinical data (demographic- age, sex, place, occupation) including history were obtained from the patient.
- A detailed clinical examination was performed.Relevant investigations were conducted.
- Patients with or without fever and who are either smear positive for malarial parasite or positive for Becton-Dickinson's quantitative buffy coat(QBC) II system were included.
- A study group consisted of 250 patients. The control series was formed by determining the baseline distribution of ABO blood groups of 250 individuals from the general population,
- Becton-Dickinson's quantitative buffy coat (QBC) II system was used in detection of malarial parasite (MPFT-Malarial parasite fluorescent technique).
- Thick and thin smears were prepared stained and examined.
- ABO blood grouping were done using the slide agglutination method[6-11].

Exclusion criteria

1. Individuals who took antimalarial drugs within two weeks before giving blood sample.
2. Patients with fever other than smear positive malaria.
3. Patients with hematological malignancies.
4. Chronic debilitating illnesses like Diabetes Mellitus, Rheumatoid Arthritis, AIDS, Renal Failure.

Complicated malaria (WHO criteria)

1. Impaired consciousness (but arousable)
2. Prostration and extreme weakness
3. Jaundice
4. Cerebral malaria (unarousable coma not attributable to any other cause in a patient with Falciparum malaria
5. Generalized convulsions
6. Normocytic Anemia
7. Renal failure
8. Hypoglycemia
9. Fluid, electrolyte, acid base disturbance
10. Pulmonary oedema
11. Circulatory collapse and shock (algid malaria)
12. DIC
13. Hyperpyrexia

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14. Hyperparasitemia
15. Malarial haemoglobinuria

Observations and Results

Sex predominance

The study group was comprised of a total of 250 malaria patients. The following graph and table represent the sex prevalence in this group. Majority of the cases were found among males (209 patients; 83.6%) than among the females (41 patients; 16.4%).

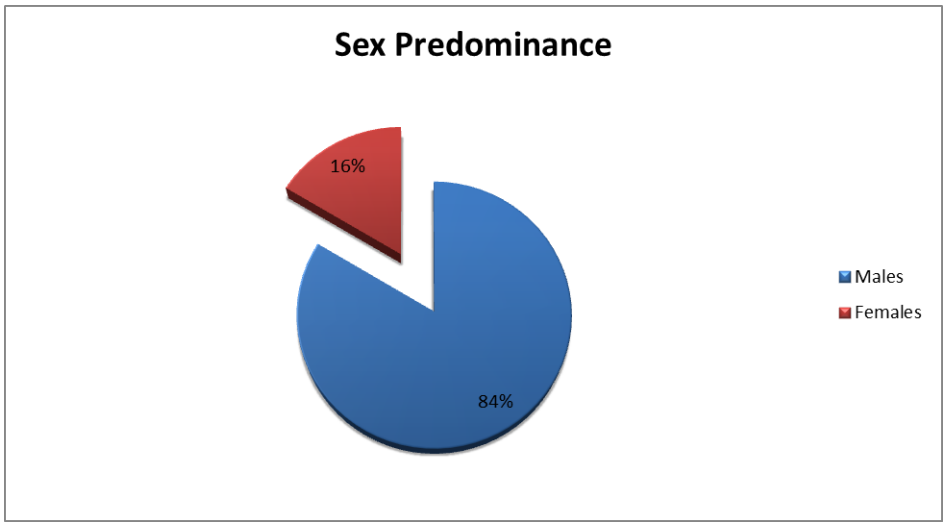


Fig 1:Sex predominance

Table 1:Sex predominance

		Group		
		Malaria	Controls	Total
Sex	F	41	135	176
		16.4%	54.0%	35.2%
	M	209	115	324
		83.6%	46.0%	64.8%
Total		250	250	500
		100.0%	100.0%	100.0%

Chi square test $\chi 2=77.476$

P=.000<0.001, HS

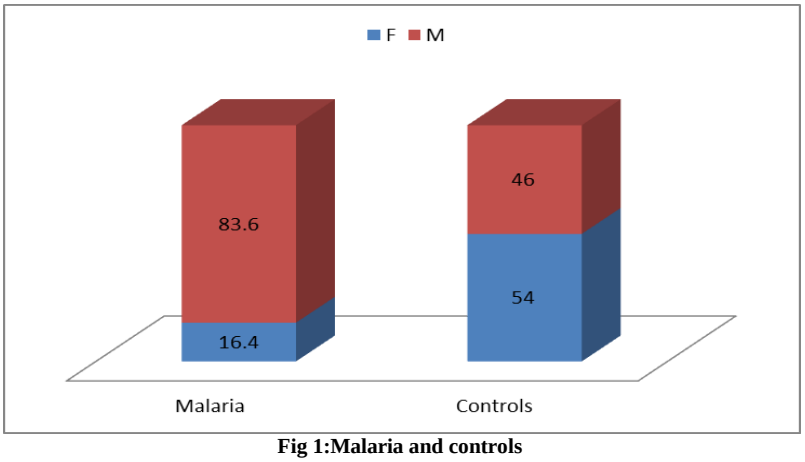


Fig 1:Malaria and controls

Age wise distribution

The study group was divided into groups based on age. Malaria was found to be most common in the 21-30 years of age group (43.6%) followed by those between the age group of 20 years and below. Incidence was less at the older age group i.e. between 51-60 and those who were 60 years and above.

Table 2:Agewise distribution

		Group		
		Malaria	Controls	Total
Age	20 yrs and below	45	16	61
		18.0%	6.4%	12.2%
	21 - 30 yrs	109	76	185
		43.6%	30.4%	37.0%
	31 - 40yrs	43	40	83
		17.2%	16.0%	16.6%
	41 - 50yrs	26	48	74
		10.4%	19.2%	14.8%
	51 - 60yrs	16	40	56
		6.4%	16.0%	11.2%
	Above 60	11	30	41
		4.4%	12.0%	8.2%
Total		250	250	500
		100.0%	100.0%	100.0%

Chi square test, $\chi 2=45.413$

P=.000<0.001, HS

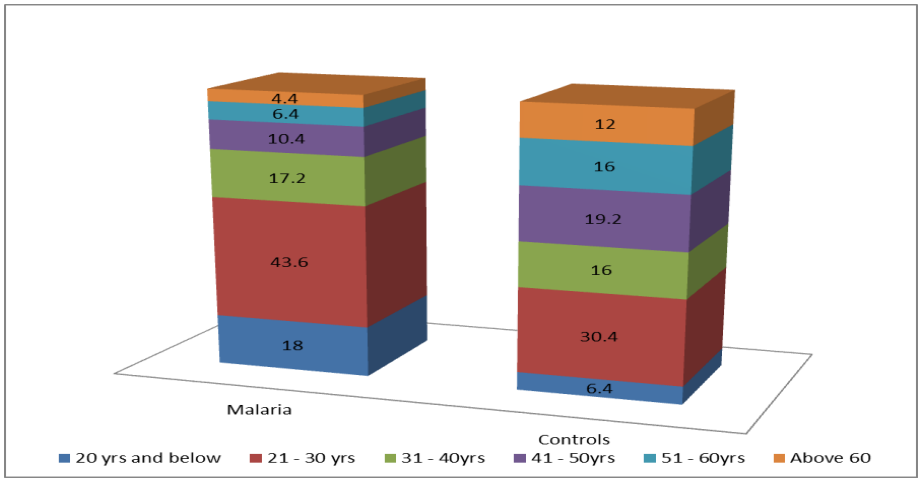


Fig 2:Agewise distribution

Blood Group Prevalence

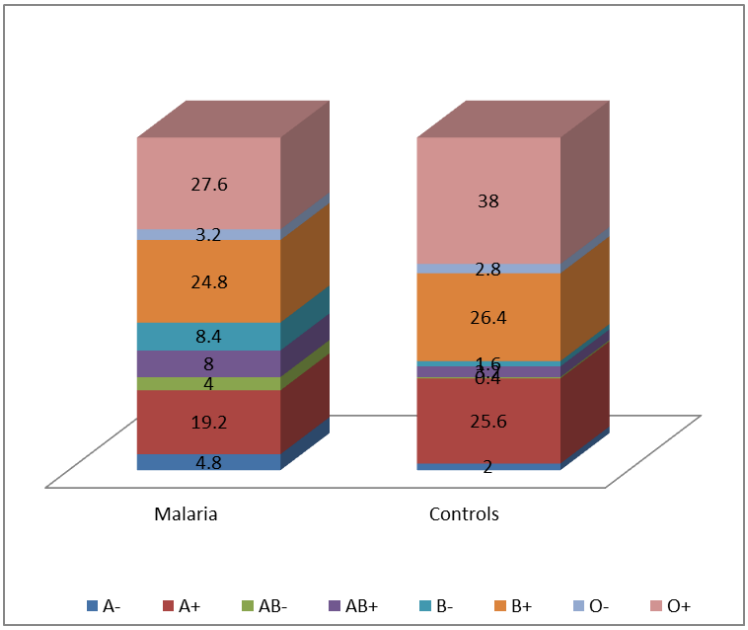
The following table and graph show the blood group prevalence in the control group and in patients with malaria. In both these groups, the commonest blood group to be found was O+ with a value of 38% and 27.6% respectively.

Table 3:Blood group prevalence

		Group		
		Malaria	Controls	Total
Blood Group	A-	12	5	17
		70.6%	29.4%	100.0%
		4.8%	2.0%	3.4%
	A+	48	64	112
		42.9%	57.1%	100.0%
		19.2%	25.6%	22.4%
	AB-	10	1	11
		90.9%	9.1%	100.0%
		4.0%	.4%	2.2%
	AB+	20	8	28
		71.4%	28.6%	100.0%
		8.0%	3.2%	5.6%
	B-	21	4	25
		84.0%	16.0%	100.0%
		8.4%	1.6%	5.0%
	B+	62	66	128
		48.4%	51.6%	100.0%
		24.8%	26.4%	25.6%
	O-	8	7	15
		53.3%	46.7%	100.0%
		3.2%	2.8%	3.0%
	O+	69	95	164
		42.1%	57.9%	100.0%
		27.6%	38.0%	32.8%
Total		250	250	500
		50.0%	50.0%	100.0%
		100.0%	100.0%	100.0%

Chi square test, $\chi^2 = 33$

P=.000<0.001, HS



Discussion

Malaria has been emerging as a major national health problem with considerable morbidity and mortality and has long been eluding our efforts for an effective control.

Since blood group are an expression of genetic constitution, it was decided to study their influence on susceptibility to malaria[11-15]

1. In the 250 cases studied, more infected cases were found among males (83.6%)

2. It was also found that most of the cases were in the 21-30 age group (43.6%). Gupta and Chowdhuri 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%)[20]
3. The baseline distribution of blood groups in the normal population was established by taking samples from 250 individuals. Blood group O+(38.0%) was the commonest in the population. Tyagi S.P found blood group B to be the predominant blood group (37.21%) in his study of the distribution of blood groups in Uttar Pradesh[16-19].

Table 4:Distribution of ABO blood groups

Sex	Total	Blood Groups			
		O	A	B	AB
Males	8800	2738(31.00)	2077(23.61)	3300(37.5)	695(7.89)
Females	4305	1375(31.93)	995(23.11)	1576(36.63)	359(8.33)
Total	13105	4103(31.31)	3072(23.440	4876(37.21)	1054(8.04)

Chowdhuri et al found blood group B to be predominant in their control baseline group (41.92%.)

1. Blood group O+ was commonest in the study group (27.6%) i.e., in the patients with malaria but this was statistically significant P = 0.000
2. Chowdhuri et al in their study found group B predominance in malaria cases (41.8%).

Table 5:Distribution of ABO blood groups in malaria cases and control

Blood Group	Malaria			
	Controls		Cases	
	No.	%	No.	%
A	229	17.62	138	29.0
B	535	41.92	199	41.8
O	428	32.92	106	22.2
AB	98	7.54	33	7.0
Total	1300		476	

Conclusion

1. Malaria is more common in Males.
2. It is predominantly found in the 21 – 30 year of age group.
3. The baseline population showed a predominance of blood group O+.
4. The maximum number of malaria patients was in blood group B.

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Conflict of Interest: Nil
Source of support:Nil