

## Original Article

### Association of ABO Blood Group and Malaria

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#### ABSTRACT:

**Background:** Malaria is an infection caused by intracellular protozoan parasites of the genus Plasmodium and transmitted by the bite of infected female Anopheles mosquitoes. The present study was conducted to evaluate association of ABO blood group and malaria.

**Materials & Methods:** The present study was conducted on 220 malaria patients. In all 5 ml of venous blood was collected in EDTA-K3 blood containers, under aseptic condition, mixed gently for the determination of direct ABO blood grouping, using Spectrum antisera-Egypt. **Results:** Males were 105 and females were 115. Out of malarial falciparum patients, 50 had blood group A, 45 had B, 30 had AB and 15 had O. Out of malarial vivax patients, 25 had A, 20 had B, 18 had AB and 17 had O blood group. **Conclusion:** Most malarial patients were seen in blood group A. Plasmodium falciparum cases were more than Vivax.

**Key words:** ABO, Malaria, Plasmodium.

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#### INTRODUCTION

Malaria is an infection caused by intracellular protozoan parasites of the genus Plasmodium and transmitted by the bite of infected female Anopheles mosquitoes. Out of the four species that infect humans, Plasmodium falciparum is the principal cause of severe clinical manifestations. Cytoadherence and rosetting are important components of several possible pathogenic mechanisms attributed to the cause of severe infection. An association between 'O' blood group and lower rosetting capacity has been demonstrated. However, rosetting capacities of blood group 'A', 'B' or 'AB' have remained controversial.<sup>1</sup>

Some studies reported the absence of significant association between P. falciparum and ABO antigens. On the other hand, other studies have shown that high frequency of malaria episodes has been observed among blood group 'A' individuals as compared with other blood group individuals. Large numbers of severe malaria cases were also reported among blood group 'A' individuals.<sup>2</sup>

A and B blood group antigens are trisaccharides bound to a variety of glycoproteins and glycolipids on the surface of red blood cells, and these trisaccharides are thought to act as receptors for rosetting on uninfected red blood cells and

bind to parasite resetting ligands such as PfEMP-1 and sequestrin. However, blood group antigens A and B are not expressed in blood group O individuals. As a result, rosettes formed by blood group O are suggested to be smaller and easily disrupted than rosettes formed by blood group A, B or AB red blood cells.<sup>3</sup> The present study was conducted to evaluate association of ABO blood group and malaria.

#### MATERIAL & METHODS

The present study was conducted on 220 malaria patients of both genders diagnosed with immunochromatography test. All were informed regarding the study and written consent was obtained. Ethical clearance was taken prior to the study.

General information regarding patient age, name and gender etc. was recorded. In all 5 ml of venous blood was collected in EDTA-K3 blood containers, under aseptic condition, mixed gently for the determination of direct ABO blood grouping, using Spectrum antisera-Egypt. Results were subjected to statistical analysis. P value less than 0.05 was considered significant.

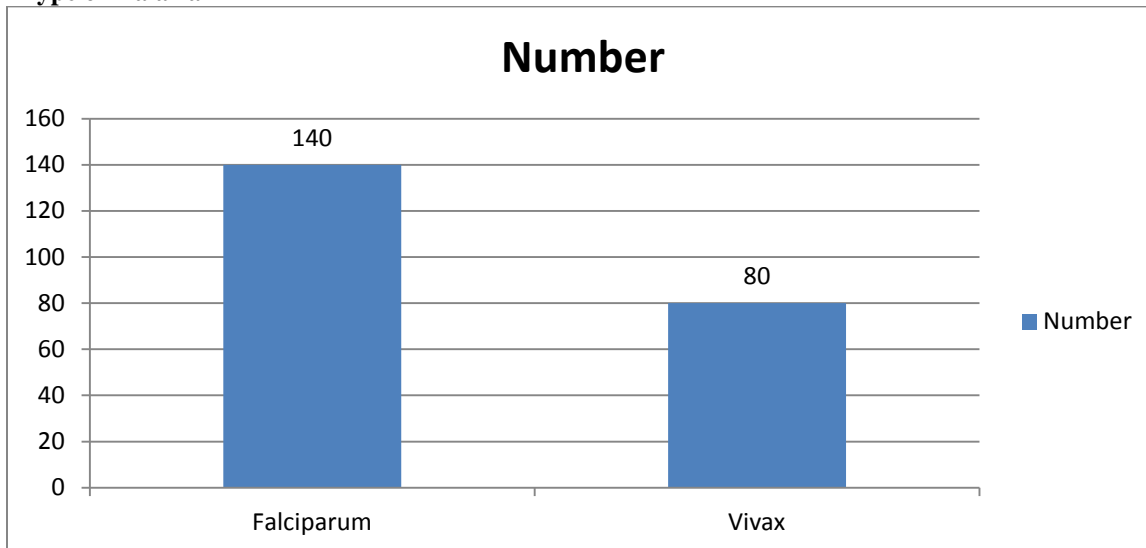
**RESULTS**

**Table I Distribution of subjects**

<b>Total- 220</b>		
<b>Gender</b>	<b>Males</b>	<b>Females</b>
Number	105	115

Table I shows that males were 105 and females were 115.

**Graph I Type of malaria**

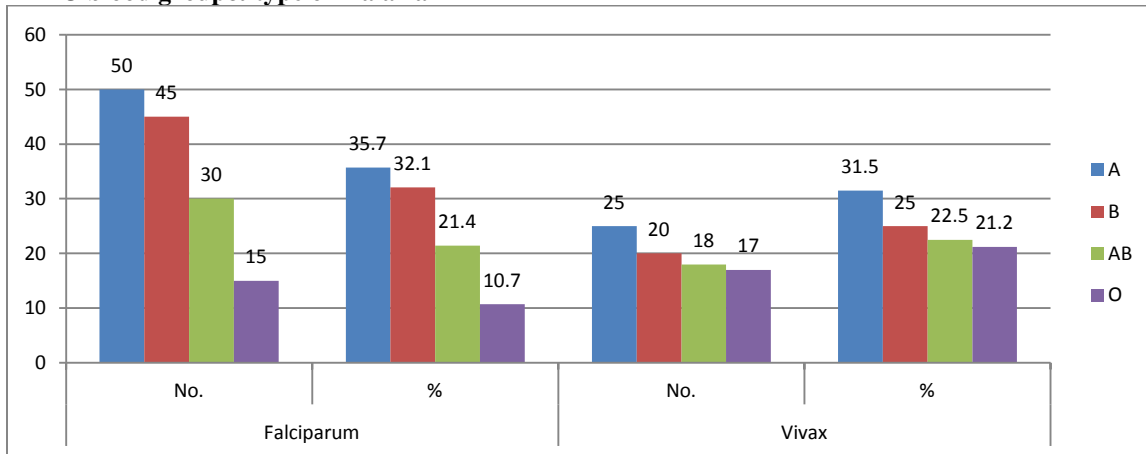


**Table II ABO blood group& type of malaria**

Blood group	Falciparum		Vivax	
	No.	%	No.	%
<b>A</b>	50	35.7	25	31.5
<b>B</b>	45	32.1	20	25
<b>AB</b>	30	21.4	18	22.5
<b>O</b>	15	10.7	17	21.2
<b>Total</b>	140	100	80	100

Table II, graph II shows that out of malarial falciparum patients, 50 had blood group A, 45 had B, 30 had 21.4 and 15 had O. Out of malarial vivax patients, 25 had A, 20 had B, 18 had AB and 17 had O blood group.

**Graph II ABO blood group& type of malaria**



## DISCUSSION

Malaria remains a major health problem in India. The National Vector Borne Disease Control Programme (NVBDCP), India, has reported that 1.8 million cases of malaria and 1,000 malaria-related deaths occur annually. However, the World Health Organization (WHO) estimates that figure to be 20 million cases and 15,000 deaths. A recent study reported a staggering 1,22,000 deaths due to malaria in India, and Odisha as a major contributor to this mortality. Although the state is hyper-endemic to *P. falciparum* malaria and contributes 29.8% of deaths related to the infection.<sup>4</sup>

Variations in reports on the association of ABO blood groups and disease progression of malaria show the complexity of the interaction between the parasite and host immune responses. In addition studies have shown the impact of other red blood cells (RBC's) polymorphisms including haemoglobin abnormalities such as HbS, HbC, thalassemia and deficiency in erythrocyte complement receptor (CR) or glucose-6-phosphate dehydrogenase deficiency on malaria susceptibility and severity. There is a paucity of hospital-based, comparative studies to investigate the relationship between blood group types and severity of malarial infections.<sup>5</sup>The present study was conducted to evaluate association of ABO blood group and malaria.

We found that males were 105 and females were 115. In this study, out of malarial *falciparum* patients, 50 had blood group A, 45 had B, 30 had 21.4 and 15 had O. Out of malarial *vivax* patients, 25 had A, 20 had B, 18 had AB and 17 had O blood group.

Frequency of blood group 'B' was significantly higher in patients with severe malaria compared to the uncomplicated cases and healthy controls. Irrespective of the level of clinical severity, blood group 'B' was significantly associated with cerebral malaria, multi-organ dysfunction and non-cerebral severe malaria patients compared to the uncomplicated category. Prevalence of 'O' group in uncomplicated malaria and healthy controls was significantly high compared to severe malaria. Meta-analysis of previous studies, including the current one, highlighted the protective nature of blood group 'O' to severe malaria. On the other hand, carriers of blood group 'A' and 'AB' were susceptible to malaria severity.<sup>6</sup>

Bassani et al<sup>7</sup> found that there was a significant association between the ABO blood group and malaria infection with. The most frequent blood group among patient group was A

(42, 40.8%), followed by O(28, 27.2%), B (26, 25.2%), and at last AB (7, 6.8%).

It is observed that the correlation of severity of malarial infection to the patient's blood group has been of recent interest in the quest for the answers to the factors influencing clinical course of the disease. The observation by Miller et al that human erythrocytes lacking the Duffy blood group antigens are refractory to invasion by *P. vivax* parasites indicate the usefulness of studying the association of blood group with malaria. In the Indian scenario, the literature relating to malaria and the blood groups are sparse and have mixed results.<sup>8</sup>

## CONCLUSION

Most malarial patients were seen in blood group A. *Plasmodium falciparum* cases were more than *Vivax*.

## REFERENCES

1. Chung WY, Gardiner DL, Hyland C, Gatton M, Kemp DJ, Trenholme KR. Enhanced invasion of blood group A1 erythrocytes by *Plasmodium falciparum*. *MolBiochemParasitol* 2005;144:128-130.
2. Tursen U, Tiftik EN, Unal S, Gunduz O, Kaya TI, Camdeviren H, et al. Relationship between ABO blood groups and malaria. *Dermatol Online J* 2005;11:44.
3. Martin SK, Miller LH, Hicks CU, David-West A, Ugbode C, Deane M. Frequency of blood group antigens in Nigerian children with *falciparum* malaria. *Trans R Soc Trop Med Hyg* 1979;73:216-218.
4. Panda et al. Association of ABO blood group with severe *falciparum* malaria in adults: case control study and metaanalysis. *Malaria Journal* 2011 10:309.
5. Rowe JA, Handel IG, Thera MA, Deans AM, Lyke KE, Kone A, Diallo DA, Raza A, Kai O, Marsh K, Plowe CV, Doumbo OK, Moulds JM: Blood group O protects against severe *Plasmodium falciparum* malaria through the mechanism of reduced rosetting. *Proc Natl Acad Sci USA* 2007; 104:17471-17476.
6. Bassani DG, Suraweera W, Laxminarayan R, Peto R: Adult and child malarial mortality in India: a nationally representative mortality survey. *Lancet* 2010; 376:1768-1774.
7. Mahanty S, Misra SK, Adak T, Das BS, Chitnis CE: Epidemiology of Malaria transmission and development of natural immunity in a malaria endemic village, San Dulakudar, in Orissa state, India. *Am J Trop Med Hyg* 2004; 71:457-465.

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