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**Original Research Article**

**A study on relation of blood group to malaria in a  
medical college of Odisha**

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**Abstract**

Blood groups can play a direct role in infection by serving as receptors and/or coreceptors for microorganisms, parasites, and viruses. Several blood groups can modify the innate immune response to infection. Several distinct phenotypes associated with increased host resistance to malaria are overrepresented in populations living in areas where malaria is endemic, as a result of evolutionary pressures. Koraput is a malaria endemic area of the state of Odisha. Several researchers have studied the relationship between ABO blood types and malaria susceptibility but with contradictory results. However most of these studies are retrospective. Hence, Koraput being a new government medical college, the 1<sup>st</sup> semester students, most of whom are not from this endemic region and stay under similar conditions, were followed for a year for development of malaria after determining their blood group. Out of 88 students who agreed to enroll for the study, 36 (40.9 %) had blood group B, 32(36.4%) had blood group O, 16 (18.2%) had blood group A and 4 (4.5%) were AB. 83(94.3%) were Rh positive and only 5(5.7%) were Rh negative. Out of those enrolled, 4 students were excluded from follow up as they were local students and suspected to be resistant to malaria. During a follow up period of one year, only 5 students developed malaria of which 2 were blood group B and 3 were blood group O.

**Keywords:** Blood group, malaria, medical college

**Introduction**

Differences in blood group antigen expression can increase or decrease host susceptibility to many infections. Blood groups can play a direct role in infection by serving as receptors and/or coreceptors for microorganisms, parasites, and viruses. In addition, many blood group antigens facilitate intracellular uptake, signal transduction, or adhesion through the organization of membrane microdomains. Several blood groups can modify the innate immune response to infection. Several distinct phenotypes associated with increased host resistance to malaria are overrepresented in populations living in areas where malaria is endemic, as a result of evolutionary pressures [1]. Koraput is a malaria endemic area of the state of Odisha. Several researchers have studied the relationship between ABO blood types and malaria susceptibility but with contradictory results. In a study in east China, 90 (90.91%) of the patients were positive for *Plasmodium falciparum*, 8 (8.08%) were infected with *Plasmodium vivax*, and only 1 (1.01%) was infected with *Plasmodium malariae*. The most common blood group among the participants was group O (38.38%) followed by blood groups A, B, and AB, with 32.32%, 22.22%, and 7.07% cases, respectively. There was no significant relationship between the prevalence of malaria and ABO blood types ( $P > 0.05$ ). In the blood group O, the prevalence of haemolytic-uremic syndrome and cerebral malaria was 13.16% and 5.25%, respectively, which was lower than that of the other three blood types ( $P > 0.05$ ). The blood group O was the most common blood type. Due to small sample size of data, there was no significant association between ABO blood types and malaria infection [2]. A study from Nigeria showed no significant association between ABO blood groups and malaria [3]. Bedu-Addo *et al.* showed a clear protective effect of blood group O against malaria in primipara [4]. Research in Gabon reported a significant association

between blood group A and severe malaria [5]. However a study from Odisha concludes that blood group 'O' is associated with reduced and 'B' blood group with increased risk of development of severe malaria in Odisha, India.

Meta-analysis also supports the protective nature of blood group 'O' from severe falciparum infection [6]. Another study by Gupta *et al* have similar conclusions of association but that 'A' blood group is more susceptible to have malaria infection and risk of cerebral malaria and DIC in malaria is also more in 'A' group individuals [7].

However most of these studies are retrospective. Hence this study has been designed as a prospective one in which the blood group of a sample population shall be determined and they will stay under similar conditions and be followed for development of malaria.

Hence, Koraput being a new government medical college, the 1<sup>st</sup> semester students, most of whom are not from this endemic region and stay under similar conditions, were followed for a year for development of malaria. Apart from research this was of health benefit for the students.

As a 1<sup>st</sup> step to this prospective study, their blood group was ascertained and database maintained for

1. Providing a referendum for blood group of the students as a mark of identity.
2. Database for donor pool.
3. For follow up for malaria.

### Materials and methods

Informed consent was taken from the 1<sup>st</sup> semester MBBS students. Their ABO and Rh blood groups were ascertained by the agglutination method. A drop each of anti A, anti B and anti D (for Rh) anti sera were taken in different slides. A drop of saline diluted blood was added to each of anti A and anti B, and a drop of direct blood to anti D. They were thoroughly mixed by agitation and observed for clumping to develop which was usually immediate. In case of a waiting period of 5-10 minutes, the preparation was kept covered to prevent drying. Any discrepancy to naked eye was clarified by observing under microscope.

Then they were followed for development of malaria both clinically and hematologically. The local students were excluded from follow up due to suspected resistance.

### Results

Out of 88 students who agreed to enroll for the study, 36 (40.9 %) had blood group B, 32(36.4%) had blood group O, 16 (18.2%) had blood group A and 4 (4.5%) were AB. 83(94.3%) were Rh positive and only 5(5.7%) were Rh negative. Out of those enrolled, 4 students were excluded from follow up as they were local students and suspected to be resistant to malaria. During a follow up period of one year, only 5 students developed malaria of which 2 were blood group B and 3 were blood group O. The extremely small number precluded statistical analysis.

### Discussion

Gajjar *et al* describe the frequency of D antigen in their study (95.4%) and north Indian donors (93.6) was significantly higher than in the Caucasians (85%) and lower than in the Chinese (99%) [8]. Our study nearly matches their findings about Rh group. The distribution of ABO groups is similar to those described for Indian populations. Previous studies have proceeded retrospectively i.e. found out the blood group of malaria patients but the potential

confounding factors like distribution of different blood group types in the population cannot be ruled out. Hence this prospective study was designed. But even in this endemic area, meager number of students developed malaria, without casualty, may be due to stringent hygiene. Hence, small case number precluded robust statistical analysis.

### Conclusion and future study

The distribution of blood groups A, B, AB and O in the medical students of 1<sup>st</sup> semester is 18.2, 40.9, 4.5, 36.4 percent respectively of which 94.3% are Rh positive. Though studying in a medical college in a malaria endemic area only 5 out of 84 students developed malaria, without casualty which reflects on the hygienic living conditions provided to the medicos. Extremely small number of cases precluded statistical analysis. So this study shall be continued to subsequent batches of medical students.

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