

Seroprevalence of Malaria among Blood Donors of a Blood Bank Attached To a Tertiary Care Hospital

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Abstract:

Introduction: A transfusion transmitted infection (TTI) is a virus, parasite, or other potential pathogen that can be transmitted in donated blood through transfusion to a recipient. Transfusion-transmitted malaria occurs at an estimated rate of 0.25 cases per 1 million blood units collected. Transfusion malaria is fairly common in endemic areas. Since there was no data from our geographical area about malaria among blood donors, the present study was conducted to know the seropositivity of malaria among voluntary and replacement blood donors.

Materials and Methods: The present study was carried out in Blood bank of S.N Medical College, Bagalkot from July 2012 to June 2013. Two ml of blood sample was collected in labeled pilot tube at the time of collection of blood from donor tubing of blood bag. Serum was separated. The samples were tested for Malaria by rapid antigen detection test.

Results: Of the total 8187 screened blood donors, four units (0.04%) of the blood units were positive for malaria parasites. All the positive units were from replacement donors.

Conclusions: Our study showed that the seroprevalence of malaria was low and more in replacement donors compared to voluntary donors. These results suggest that voluntary blood donors services are needed. All blood should be tested for TTI with reduction in unnecessary blood transfusion. Thus ensuring safe blood supply to the recipients.

Keyword: Malaria, Transfusion, Blood donor, TTI, Seroprevalence

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Introduction

A transfusion transmitted infection (TTI) is a virus, parasite, or other potential pathogen that can be transmitted in donated blood through transfusion to a recipient. The most common examples are HIV, hepatitis B, hepatitis C and several other viral infections that can cause hemorrhagic fevers.¹ Nevertheless, diseases exist that are not usually transmitted through blood contact, but by insect or other vectors. Such vector-borne diseases transmitted by blood transfusion include west nile fever and malaria.²

Even a century after the discovery of malaria transmission through mosquitoes in India by Sir Ronald Ross in 1897, malaria continues to be one of India's leading public health problems. Each year approximately 2.5 million cases and 4,000 deaths are reported but the disease is grossly underestimated due to cases being seen by the private sector and otherwise not being included in the malaria control programme reporting system. Transfusion-transmitted

malaria occurs at an estimated rate of 0.25 cases per 1 million blood units collected.³

Transfusion malaria is fairly common in endemic areas. Following an attack of malaria, the donor may remain infective for years (1-3 years in *P. falciparum*, 3-4 years in *P. vivax*, and 15-50 years in *P. malariae*.) Most infections occur in cases of transfusion of blood stored for less than 5 days and it is rare in transfusions of blood stored for more than 2 weeks. Frozen plasma is not known to transmit malaria.⁴

Rapid diagnostic tests (RDTs) for malaria are based on the detection of antigens derived from malaria parasites in lysed blood, using immunochromatographic methods. Most frequently they employ a dipstick or test strip bearing monoclonal antibodies directed against the target parasite antigens. The tests can be performed in about 15 minutes. Several commercial test kits are currently available. Other diagnostic methods are available, but they are not as suitable for wide field application as microscopy or RDTs and are unsuitable for use in routine disease management. They include microscopy using fluorochromes, polymerase chain reaction (PCR) based tests and antibody detection by serology.^{5,6}

Since there was no data from our geographical area about malaria among blood donors, the present study was conducted to know the seropositivity of malaria among] voluntary and replacement blood donors using rapid test.

Materials and Methods

The present study was carried out in Blood bank of S.N Medical College, Bagalkot from July 2012 to June 2013. The study was approved by institutional ethical committee.

The blood bank of department of pathology, S.N Medical College is licenced blood bank with average annual collection of 8000 units of blood from healthy blood donors from in and around Bagalkot annually.

Inclusion criteria: Any donor meeting all criteria's for eligibility of blood donation as mentioned in SOP, Blood Bank, S. N .Medical College, Bagalkot.

Exclusion criteria: Any eligible donor having any kind of reaction during the blood donation procedure was excluded from the study.

Sample collection: Two ml of blood sample was collected in labeled pilot tube at the time of collection of blood from donor tubing of blood bag. The sample was centrifuged at 3500 rpm for 5 minutes to obtain clear non hemolyzed serum.

Table 1: Seroprevalence of malaria in different donor categories.

| Donor category | No of screened blood units | No. of seropositive units | Percentage |
|----------------|----------------------------|---------------------------|------------|
| Voluntary | 726 | 0 | 0% |
| Replacement | 7461 | 4 | 0.05% |
| Total | 8187 | 4 | 0.04% |

Table 2: Age wise Distribution of Malaria positive donors

| Age Range (yrs) | No. of positives | Percentage |
|-----------------|------------------|------------|
| 18-25 | 0 | 0% |
| 26-35 | 1 | 25% |
| 36-45 | 0 | 0% |
| 46 and above | 3 | 75% |
| Total | 4 | 100% |

Table 3: Percentage of voluntary and replacement donors in different studies.

| Authors | Voluntary donors (%) | Replacement donors (%) |
|---------------------------------|----------------------|------------------------|
| Srikrishna et al ⁷ | 1.5% | 98.5% |
| Kakkar et al ⁸ | 5.3% | 94.7% |
| Singh et al ⁹ | 15.5% | 84.5% |
| Bhattachary et al ¹⁰ | 94.6% | 5.4% |
| Pallavi et al ¹¹ | 64.78% | 35.22% |
| Present study | 8.87 | 91.13% |

Discussion

The risk of transfusion transmissible infections (TTI) has declined dramatically in developed nations over the past two decades, primarily because of extraordinary success in preventing HIV and other established transfusion transmitted viruses from

Test for malaria was done by rapid antigen detection test-PAN MALARIA CARD (J. Mitra & Co pvt ltd, India), which is a visual, rapid and sensitive immunoassay for the qualitative diagnosis of infection with all four Plasmodium Species (P. falciparum/P. vivax/ P. malariae/P. ovale) in human whole blood.

Results

Table 1, shows seropositivity of malaria in different donor categories. Out of the 8187 blood donors, 7461 (91.13%) were replacement donors and remaining 726 (8.87%) were voluntary donors.

Of the total 8187 screened blood donors, four units (0.04%) of the blood units were positive for malaria parasites. All the positive units were from replacement donors. Out of four donors three were married & from rural area, one was unmarried and from urban area.

Table 2, shows age wise distribution of malaria positive donors. Maximum positive donors were 46 years and above.

entering the blood supply. But same may not hold good for the developing countries. The National Policy for Blood Transfusion Services in our country is of recent origin and the transfusion services are hospital based and fragmented.

It is shown that replacement donors constitute the largest group of blood donors in India reflecting lack of awareness among the general population, the presence of misconceptions and fears associated with donating blood, the lack of health education and the indifference attitude of the health sector.

Table 3 shows, percentage of voluntary and replacement donors in different studies. In a study by Srikrina et al (1999),⁷ out of the total 8,617 screened blood units none of the units were positive for malaria. Similar finding was noted by Sonawane et al (2003)¹² at Ambajogai.

Ghouzzi et al (2008)¹³ studied the result of new ELISA malaria screening. The observed malaria prevalence was 0.05%. Hilda F. et al¹⁴ have reported 0.01% seropositivity among blood donors.

Momoh ARM et al, have reported that after staining, 25 of the post transfusion blood samples were positive for *Plasmodium falciparum* (22; 40.00%), and *Plasmodium malariae* (3; 5.45%) parasites. Concluded that, 45.45% parasites discovery in the post transfused blood sample signifies that malaria is prevalent in Nigeria.²

Chavan SK in their study have reported that over the last 10 years malarial infection has been negligible in the studied population. Prevalence of Malaria was low (0.002 %) with only one case being detected overall (in year 2013). No cases of Malaria were detected in other years (2004 to 2012).¹⁵ Though globally malaria constitutes a big health problem in general population, the prevalence of malaria among

the blood donors is low in most studies and ranges from 0% to 0.05%.

Four of the donors(0.04%) in our study were positive for malaria same as that observed by Ghouzzi et al (2008).⁸² This observed malaria positivity rate may be the result of proper scrutiny of prospective donors. This point to the need for the use of more sensitive technique for screening of malaria to avoid post transfusion malaria particularly in pregnant women and immunodeficient patients in whom it is fatal. In endemic area, it is recommended that chemoprophylaxis should be given to all recipients.

Our study showed that the seroprevalence of malaria was more in replacement donors compared to voluntary donors. However it was statistically not significant. These results suggest that voluntary blood donors services are needed. There should be an establishment of nationally coordinated blood transfusion services. All blood should be tested for TTI with reduction in unnecessary blood transfusion. Thus ensuring safe blood supply to the recipients.

With the implementation of strict donor selection criteria, use of sensitive screening tests, and establishment of strict guidelines for blood transfusion, it may be possible to reduce the incidence of TTI in Indian scenario.

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