Malaria positivity among blood donors: an important index to assess blood safety

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Abstract Blood transfusions carry the potential for causing increased morbidity & mortality both in terms of transfusion reactions as well as transfusion transmitted infections. It is therefore mandatory to test for transfusion transmitted diseases before any unit is transfused to a patient. In India it is mandatory to screen all units for HIV, HBsAg, HCV, Syphilis and Malaria. This study was done to study the incidence of malaria among blood donors at the blood bank of a tertiary care centre of Uttarakhand, India over a period of 2 years and also to analyse any associated factors. Any sample found positive was retested for confirmation by blood smear examination & using another kit. A total of 17,209 donors donated blood over a 2 year period and 14 donors (0.08 %) were found to test positive for malaria parasite. Only one case was a voluntary donor and the remaining 13 were replacement donors. It was seen that there was a peak in the months of September and October.

Keywords Malaria · Blood donors · Safety · Transfusions

Introduction

Blood is a life saving modality; however it carries the potential for causing increased morbidity & mortality both in terms of transfusion reactions as well as transfusion transmitted infections. It is therefore mandatory to test for transfusion transmitted diseases before any unit is

transfused to a patient. In India it is mandatory to screen all units for HIV, HBsAg, HCV, Syphilis and Malaria. Among these, the transmission of parasitic organisms through transfusion is relatively rare. Parasitic organisms implicated in TTI are *Plasmodium* sp., *Trypanosoma cruzi*, *Babesia microti*, *Toxoplasma gondii*, *Leishmania* sp. etc. Malaria is comparatively a more common cause in tropical countries. This study was done to study the incidence of malaria among blood donors and also to analyse any associated factors.

Materials and methods

All donors coming to the blood bank of a tertiary care centre of Uttarakhand, India over a period of 2 years were screened for TTIs including HIV, HBsAg, HCV, Syphilis and Malaria. Testing for malaria was done using rapid immunochromatographic assay (rapid one step malaria LDH detection test). The test was done following manufacturer's directions. Any sample found positive was retested for confirmation by blood smear examination & using another kit. Reactive units were discarded.

Results

A total of 17,209 donors donated blood over a 2 year period and 14 donors (0.08 %) were found to test positive for malaria parasite. All such cases were confirmed by blood smear examination and repeating with another kit. No discrepancy was found among the methods used. Only one case was a voluntary donor and the remaining 13 were replacement donors. Two (14.3 %) out of the 14 donors were also reactive for HIV.

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The temporal trend of the occurrence of these cases is shown in Fig 1. It was seen that there was a peak in the month of September and October in both years. When donor forms were retrieved, it was found that none of the donors had a history of fever. The donors were in the age groups 16–60 years. There was no suggestive history of malaria among the donors. The donors were from the hilly state of Uttarakhand with few from adjoining states as well.

Discussion

Malaria transfusion occurs naturally by the bite of female anopheles mosquito. It may also occur through infected blood transfusion from an asymptomatic carrier causing transfusion associated malaria. Plasmodium can survive in blood components stored at room temperature at 4 °C for at least 1 week. Deglycerolized RBCs can also transmit the disease (Harmening 1998).

According to AABB standards, persons who have travelled to an endemic area are deferred for 1 year and those who have had malaria, immigrated from on lured in an endemic area are deferred for 3 years. Some individuals have a natural immunity to some species of malaria due to a genetic alternation in their RBCs e.g. people with sickle cell disease or trait, G6PD deficiency or RBCs lacking the Duffy antigen.

In the studies by Chatteraj et al. 2008 and Choudhury and Tetali 2007 on blood donors, it was seen that no sample showed positivity for malaria. Saeed et al. 2002 found 0.17 % antigen positivity in Saudi Arabian blood donors. Ghimire et al. 2007 reported 0.33 % positivity in Nepalese donors. Ali et al. 2010 found 0.57 % positivity among donors in Pakistan. Studies by Okocha et al. 2005 and Epiidi et al. 2008 in Nigeria in have shown very high figures of 30.2 and 51.5 %. Bahadur et al. 2010 found 0.03 % of their blood donor units to be positive for

malarial parasite. They have even recommended the use of rapid tests with peripheral smear screening to be a reasonably reliable method for preventing transfusion transmissible malaria in India. Okocha et al. 2005 reported that the prevalence of malaria parasite among blood donors showed a bimodal distribution with two peaks-at the onset & late part of rainy season. The rainy season (April–October) had an average prevalence of 55 % while the dry season (November–March) had an average prevalence of 26.92 % (7).

In our study 0.08 % of donors were found to be positive. An interesting trend that was noted over the 2 years of study was that there was a clustering of these cases in the months of September and October which are also the months when malaria infection is more common. It is possible that these donors could have been in an asymptomatic stage at the time of donations of blood. It is therefore very important to screen donors using sensitive tests to pick up such cases. Another important point to be considered is the fact whether the donors could be concealing the history of fever in order to provide replacement for their relatives. Whatever the reason, the importance of adequate history taking and increasing voluntary blood donations cannot be overemphasized. It was also demonstrated from our study results that only one of the MP Positive donors was a voluntary blood donor. Voluntary donors are usually healthy donors who carry much less chances of carrying infectious diseases and will never conceal any positive history as he/she donates blood with altruistic intentions.

It is important to recognize transfusion transmitted malaria because it can lead to a febrile transfusion reaction simulating a hemolytic transfusion reaction. It can also lead to widespread dissemination and spread of drug resistant malarial parasite. Traditional blood smear examination involves a lot of labor when larger numbers of donor samples are involved, requires high skill level and results

Fig. 1 Temporal trend of malaria positivity among blood donors

are doubtful in cases of low parasitemia. Other alternates are immunological and molecular techniques.

Conclusion

The study concluded that:

- 1 Positivity of 0.08 % was seen for malarial parasite among blood donors at the blood bank of a tertiary care hospital in the state of Uttarakhand, India.
- 2 The peak incidence of MP positivity was in the months of September and October.
- 3 Rapid malaria antigen test can be effectively used for effective screening of blood in blood banks. Moreover, there should be more extensive studies on malaria infection among blood donors.

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