



Original Research Article

Trends in Seroprevalence of Malaria among Blood Donors in a North Indian Tertiary Health Care Centre: Importance of Prevention of Transfusion-Transmissible Malaria

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ABSTRACT

Safety of blood & blood components is a major problem all over the world. For this, screenings of blood bags for infectious diseases is necessary in addition to the donor selection. Transfusion-transmissible malaria (TTM) is a major concern in malaria endemic zones especially in northern India. Therefore, a study was conducted to know the trends in seroprevalence of malaria in blood donors. A retrospective analysis of blood donors from January 2011 to December 2014 was conducted in blood bank of JN Medical College, AMU Aligarh. Donors were not having the history of fever for 6 months. Blood samples of these donors were screened for Malaria by SD Malaria Ag Pf/Pan (SD Bio Standard Diagnostics Private Limited). A total of 78,423 healthy blood donors were tested, out of which 4078 (5.2%) were females and 74,345 (94.8%) were males. The overall seroprevalence of malaria was 96 (0.12%). There were 12 (0.07%) cases out of 16,946 in 2011, 62 (0.33%) cases out of 18,851 in 2012, 14 (0.06%) cases out of 23,233 in 2013 and 8 (0.04%) cases out of 19,393 in 2014. The subclinical malarial infection though may not be harmful for the donors but it will be definitely harmful for the recipients who already are in diseased state.

Keywords

Seroprevalence,
Transfusion-
transmissible
malaria,
Endemic,
Blood donors

Introduction

Blood transfusion involves transfer of biological material from man to man. Transfusion of blood and blood products is a lifesaving phenomenon that forms an integral part of medical and surgical therapy (Arora *et al.*, 2010; Ekdashi and Langer, 2009). Globally, more than 81 million units of blood are donated each year (WHO fact sheet on Blood safety and donation, 2008).

More than 18 million units of blood are not screened for transfusion transmissible infections (WHO Guidelines of Blood Transfusion Safety). They are therefore unlikely to be totally free of the risk of the infections. Widman (1985), has claimed that with every unit of blood, there is a 1% chance of transfusion associated problems including transfusion transmitted diseases.

Transfusion therapy is a form of treatment based on the use of blood and its products of humans. Although this therapy helps to save human lives, blood can nonetheless be a dreadful vehicle for the transmission of some infectious and parasitic diseases; among them is a malaria fever, caused by plasmodium species. It is a major public health problem in India.

However, the malaria endemicity is quite variable across the country (Kumar *et al.*, 2007). The annual parasite incidence (API) from our region is reported to be <2 per 1000 population whereas regions with API >5 per 1000 are scattered in the states of Rajasthan, Gujarat, Karnataka, Goa, Southern Madhya Pradesh, Chhattisgarh, Jharkhand, Orissa, and North Eastern States (Kumar *et al.*, 2007). In endemic areas, transfusion transmitted malaria (TTM) can be a significant problem because of certain characteristics of malaria infection, i.e.: (a) Semi-immune individuals with low level of parasitaemia remain asymptomatic and can qualify as blood donors, (b) *Plasmodia*, the malarial parasite, is able to survive in blood stored at 4°C, and (c) The sensitivity of currently used methods for malaria screening (Microscopic examination: ~ 50 parasites/μL; rapid diagnostic device (RDT): ~ 100 parasites/μL) is much lower than that required to detect level of parasitaemia capable of causing TTM (~0.00004 parasites/uL or 1-10 parasites/unit of blood) (Malik, 2001).

Malaria in endemic regions exerts its effects mostly on people with low immune status like pregnant mothers, children, foreigners (Weir and Stewart, 1997) and now, possibly HIV/AIDS patients (Chandramohan and Greenwood, 1998; Migot *et al.*, 1996). In the case of sickle cell disease, it is thought to help in maintaining the sickle cell gene in the population (Luzzattee, 1979). This study

aimed to determine the seroprevalence and trends of malaria in blood donors in the last four years in a tertiary health care centre of Northern India.

Material and Methods

A retrospective analysis of blood donors from January 2011 to December 2014 was conducted in blood bank of J.N. Medical College, AMU Aligarh. Donors were not having the history of fever for 6 months. Blood samples of these donors were screened for Malaria by SD Malaria Ag Pf/Pan (SD Bio Standard Diagnostics Private Limited).

Observations

A total of 78,423 healthy blood donors were tested, out of which 4078 (5.2%) were females and 74,345 (94.8%) were males (Table 1). The overall seroprevalence of malaria was 96 (0.12%). There were 12 (0.07%) cases out of 16,946 in 2011, 62 (0.33%) cases out of 18,851 in 2012, 14 (0.06%) cases out of 23,233 in 2013 and 8 (0.04%) cases out of 19,393 in 2014 (Table 2). In 2012, monthly prevalence showed 36 (58%) cases out of 62 in the month of August and September (Table 3), showing monsoon season as the triggering event for the abrupt increase in the number of malaria cases among blood donors.

Results and Discussion

Out of 78,423 healthy blood donors, 74,345 (94.8%) were males and only 4078 (5.2%) were females (Table 1). This is because of the fact that in developing country like India, because of social taboo and cultural habits, number of female donors is very less. Other reason is that a large number of females from the menstruating age-group are anemic, so declared unfit for blood

donation and eliminated during history and examination. The prevalence of malaria parasitaemia among blood donors at different times of the year shows two peaks (Table 3), the lower peak during the month of May (at the onset of the rainy season) and the higher peak during the months of August and September (towards the end of the rainy season). These seasonal peaks are similar to the peaks of mosquito biting density found by other workers in Pakistan and to other authors reporting seasonal peaks of malaria in other regions (Roland *et al.*, 1997).

In our study, the prevalence of malaria in healthy donors was 0.12% overall, with an yearly prevalence of 0.07% in 2011, 0.33% in 2012, 0.06% in 2013 and 0.04% in 2014 (Table 2). The increase in prevalence in 2012 might be due to epidemic burst of malaria in an endemic zone, indicating a reflection of the high rate of asymptomatic malaria parasitaemia in endemic malaria regions. In a study done by Bahadur *et al.* (2010) recently, 0.03% out of 11,736 units of donated blood was positive for malaria by RDT, which was in concordance with our study.

Table.1 Gender distribution of donors

	No. of donors	Frequency
Male	74345	94.8%
Female	4078	5.2%
Total	78423	100%

Table.2 Year wise seroprevalence among blood donors

Year	No. of donors	No. of malaria positive cases	Percentage
2011	16946	12	0.07%
2012	18851	62	0.33%
2013	23233	14	0.06%
2014	19393	8	0.04%
Total	78423	96	0.12%

Table.3 Month wise seroprevalence in 2012

Month	No. of donors	No. of positive cases	Percentage
January	1250	2	0.16%
February	1465	1	0.07%
March	1735	0	0%
April	1653	0	0%
May	1764	5	0.3%
June	1666	3	0.2%
July	1834	2	0.1%
August	1509	13	0.8%
September	1510	23	1.5%
October	1690	8	0.5%
November	1350	4	0.3%
December	1425	1	0.07%
Total	18851	62	0.33%

In conclusion, the present study showed that there is high prevalence of malaria parasite among the blood donors at the study site during the course of the study. Therefore, there is risk of malaria parasite being transmitted to recipients during blood transfusion. Our study raises serious concern regarding Transfusion-transmissible malaria among blood donors especially in and around Aligarh as it is an endemic zone for malaria. The subclinical malarial infection though may not be harmful for donors but it will be definitely harmful for the recipients who already are in diseased state especially in immune-compromised recipients such as children under ages less than five years and pregnant women. Strict selection criteria for blood donors on the basis of history and examination and comprehensive screening of donors' blood using standard test are highly recommended to ensure the safety of blood/component transfusion.

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