Prevalence of Haemoparasites (Plasmodium and Microfilaria) in Blood Donors Attending University Of Maiduguri Teaching Hospital (UMTH)

Bukar Alhaji, Mary Ann Amarachi Umeh, Obi Simon Osita, Waziri Gimba, Medugu Jessy Thomus
Department of Haematology, University of Maiduguri Teaching Hospital, Maiduguri,
Anthony Nwobi, Osakue Eguagie Osareniro
Department of Chemical Pathology, Igbinedion University Teaching Hospital, Okada
Olaniyi Matthew Folaranmi
Department of Medical Laboratory Science, Achievers University, Owo
Jeremiah Zaccheaus Awortu.
Department of Medical Laboratory Science, Niger Delta University
All correspondence to: alhajibukar@gmail.com.

ABSTRACT
Haemoparasite,such as Plasmodium and Microfilaria are animal parasite living
in the blood of a vertebrate host. The study was aimed to determine the
prevalence of Haemoparasite (Plasmodium and Microfilaria) in blood donors attending University of Maiduguri Teaching Hospital. A total of 230 blood donors were recruited for this study using simple random sampling. A semi-structured questionnaire was used to collect data regarding demographic and social profile of the subjects. Giemsa stained thick blood film was used for the detection of malaria parasite while wet preparation was used for the detection of microfilaria. A total of 78 blood donors had malaria parasites while no filarial parasite was recorded showing a prevalence of 33.9% and 0% respectively. The prevalence of malaria parasites in the blood donors was not significantly associated with usage of insecticide and/or insecticide treated net. The prevalence of malaria parasite was however significantly associated with treatment with antimalarial drugs. It is therefore necessary for the government to improve the sanitary condition of Maiduguri which will in turn reduce the availability of breeding sites for mosquitoes.

**Keywords:** Malaria, microfilaria, blood donors.

**INTRODUCTION**

Blood transfusion is potentially a lifesaving therapeutic procedure and a common form of tissue transplantation which is aimed to provide patients with blood components which they are deficient. Although, blood transfusion is generally believed to save human lives, blood can nonetheless be a route for the transmission of infections generally referred to as transfusion transmissible infections (TTIs). TTI occurs when a patient is infected by the same parasite that was present in the donor’s blood. TTIs are broadly classified into viral, bacterial, amoebal or parasitic. Haemoparasite is an animal parasite such as a haemoflagellate or filarial worm living in the blood of a vertebrate host. These parasites reside either in the blood cells or in the plasma. Malaria parasite and Babesia are haemoparasites that resides in the red blood cells, while leishmania and filarial worms resides in the white blood cells and the plasma respectively.

In Nigeria, malaria and filariasis are more prevalent and over the years varying prevalence has been recorded among Nigerian blood donors. Haemoparasites constitute a serious threat to human race as they can result in increased morbidity and mortality. Malaria is sporozoan parasite of the genus Plasmodium, its infection is transmitted naturally through the bite of infected female Anopheles mosquitoes. In endemic areas, malaria transmission is so intense that a large proportion of the population is infected but not made ill by these parasites. These carriers harbour low levels of the parasites and shows no clinical signs of infection as they are immune to parasitic illness but not to the infection and for this reason, blood from such donors contains malaria parasite which can easily be transmitted to recipients by blood transfusion. A bite from an infected mosquito may cause malaria by introducing as few as 15 parasites while a single parasite identified on a thick film (4ul) is equivalent to approximately 10,000 parasites in 450ml unit thereby causing malaria in
transfused patients. Transfusion-transmitted malaria can however have serious consequences, as infection with P. falciparum may prove rapidly fatal when such blood is transfused especially into children under 5 years, pregnant women, trauma victims with acute blood loss and immuno-suppressed patients. Malaria destroys red blood cells and converts it to methaemoglobin leading to methemoglobinemia causing illness especially in immune compromised individuals.

Filariasis on the other hand is a parasitic disease that is caused by thread-like nematodes (roundworms) belonging to the superfamily Filarioidea. These parasites are transmitted from host to host by blood feeding arthropods, mainly black flies and mosquitoes.

As adults, the worms can survive and reproduce for up to 7 years within which the worms gradually build-up in the vessels of their host. This interferes with the lymphatic system’s ability to fight infection and causes lymph fluid to accumulate in the arms, legs, breasts and male genitals leading to welling and disfigurement.

In all species, sexually mature female worms release microfilariae, which are their pre-larval stages into the bloodstream of their infected host. If the blood from microfilaraemic individuals is transfused into a patient, the transfused microfilariae may persist in the recipient’s circulation for up to 3 years. Recipient of these blood component usually develop post transfusion allergic reactions due to dying microfilariae.

In Nigeria, screening for parasitic infections is not routinely done in blood banks, nor stipulated in the current National Blood Guidelines. This is because transmission of parasitic infections such as malaria through blood transfusion is generally not regarded as a serious problem in adult and adolescent whose level of immunity is thought to be sufficiently effective in combating post transfusion malaria in an endemic area like Nigeria. These parasites are prevalent in Nigeria but the extent to which it currently affects blood donors attending UMTH is unknown, we therefore, considered it necessary to contribute some information on this subject.

**MATERIALS AND METHOD**

This study was conducted at the University of Maiduguri Teaching hospital (UMTH) from February 2017 to May 2017. A total of 230 blood donors which are negative to HIV 1/2, HBsAg, Syphilis and HCV were recruited for the study. These donors were recruited using simple random sampling. Two millilitres of the donor’s venous blood was collected into an EDTA container. ABO and RhD blood groups of the donors were determined using tile method. Malaria parasite was qualitatively determined by making thick blood films in duplicates for each blood samples on a clean grease free glass slide. these was allowed to air-dry after which it was stained with Giemsa stain. Stained films were examined under x100 objective lens of microscope with Immersion oil for any stage of malaria parasite. A slide is defined as negative if no asexual stage of the parasite is found after counting.
For, microfilaria parasite, a drop of anticoagulated blood was dispensed on a cleaned grease-free slide and covered with cover slip. It was examined microscopically using x10 and x 40 magnification for motile microfilaria. Result were analysed using, percentage and SPSS 20.0 statistical package. Chi-square was used to determine if prevalence was dependent on certain factors. A P-value of less than or equal to 0.05 (p=0.05) was considered as statistically significant.

RESULTS
A total of two hundred and thirty subjects (230) were recruited for the study. The subjects were within the age group of 18-55 years with the age group 20-29 having the highest mode (47.6%, 110/230) and age group 50-59 years with the least (3%, 7/230).

Table I shows the prevalence of malaria parasite and filarial worms in the blood donors attending UMTH. Out of the 230 blood donors studied, 78 donors had malaria parasite giving a prevalence rate of 33.9% while none had filarial worm giving a prevalence rate of 0%. Table II shows the prevalence of malaria parasite in blood donors attending UMTH in relation to blood group and donation history. Malaria parasite in respect to ABO blood group, group B donors had the highest prevalence rate of 38.1% (16/42) while blood group AB donors had no malaria parasite in their blood. This difference was not statistical significant (x² = 1.513, df= 3, p-value = 0.679). Malaria parasite with relation to Rh D blood group, Rh D- donors had a higher prevalence rate of 37.5% (6/16) while Rh D+ donors had a lower prevalence of 33.6% (72/214). This difference was also not statistically significant (x² =0.99, df =1, p-value = 0.753). Family replacement donors had a higher prevalence of malaria infection 34.2% (77/225) when compared to voluntary donors who had a prevalence rate of 20% (1/4), this difference was also not statistically significant (x² =0.441, df= 1, p=0.506). There was no commercial blood donor in this study. Repeat donors had a higher prevalence rate of malarial infection 36.1% (49/119) while first-time donors had a lower prevalence 35.1% (35/111). This prevalence is not statistically significant (x² =0.543, df= 1, p=0.461).

Table III shows the prevalence of malaria parasite in relation to some social factors. Female donors had higher prevalence rate of malaria parasite (36.4%, 4/11) compared to male donors who had a prevalence rate of 33.8% (74/219). This difference is not statistically significant (x²=0.31, df= 1, p=0.860). Donors below 20 years had the highest prevalence of malarial infection 40% (4/10) while those within the age range of 40-49 had the least prevalence. It is not statistically significant (x²=3.994, df= 4, p=0.479). The prevalence is higher among the singles, 40.7% (50/123) while no infection was detected among the divorced donor. It is not statistically significant (x²=5.66, df= 2, p=0.059).

Table IV shows the prevalence of malaria parasite in relation to usage of insecticides and/ or insecticide treated net. Blood donors who neither used
insecticides nor insecticide treated net had the highest prevalence rate of 50% (18/18) while those who used both insecticides and insecticide treated net had the least prevalence rate of 23.5% (4/17). This difference is not statistically significant.

Table V shows the prevalence of malaria parasite in relation to treatment with antimalarial drugs. Donors who said to have never been treated with antimalarial drugs had the highest prevalence of 56.7% (17/30) while donors who self-administered antimalarial drug within the last six months had the least prevalence 14.5% (11/76). This difference is statistically significant. No Filarial parasite is found in any of the donors.

**DISCUSSION**

Results obtained from this study showed that 78 blood donors had malaria while none had filarial worm showing a prevalence of 33.9% and 0% respectively. The prevalence of malaria parasitaemia in this study was lower than that reported by Abioye et al.15 who recorded a prevalence rate of 56% (140/250) in Abuja and was higher than the report of Garba et al.16 who reported a prevalence of 7.5% (27/360) in Kaduna. These differences in regional prevalence could be attributed to variation in predisposing factors such as present of Anopheles species, environmental conditions, climatic conditions, period of study, the study population and diagnostic test method used. The high prevalence rate may be attributed to current security challenges in Borno which forced people from other villages within other towns of the state to relocate to Maiduguri which in turn increases the population and decreases sanitary condition of the city. The decreased sanitary condition has resulted in increased chocked drainage channels which provide a suitable breeding ground for Anopheles mosquito. However, in
relation to filarial worms the result from this study was inconsistent with the report of Bolaji et al.3 who reported a prevalence of 2% with Loa loa, Brugria Malayia and Wuchereria Bancrofti in the following proportion; 4(1.33%), 1(0.33%) and 1(0.33%) respectively. This difference may be attributed to difference in the number of subjects and geographical locations. Although Ochocerca Volvulus is prevalent in some areas in Bornu such as Hawul18, it is not prevalent in Maiduguri possibly due to lacks fast flowing water which is a suitable breeding site for its biological vector (Backfly).

This study further revealed that malaria parasitaemia is higher among blood group B donors while no malaria parasite was recorded in AB blood donors. This result does not tally with the report of Agboola et al.5 who reported a higher prevalence among blood group O donors. This difference may be as a result of chance. The difference in malaria among ABO blood groups in this study was however not statistically significant, indicating that susceptibility to malaria parasite is independent of a person’s ABO blood group. Also, a higher prevalence of parasitaemia among Rh D negative blood donors was reported in this study compared to the Rh D+ blood donors. This finding was not similar to a report by Bankole et al.19 who reported a higher prevalence among Rh D+ blood donors. The difference between Rh D blood groups in this study was not statistically significant, indicating that susceptibility to malaria parasite is independent of a person’s Rh D blood group. The study clearly suggests that family replacement donors were the major source of blood for transfusion in UMTH. This is consistent with findings from other researchers19, 20, indicating that family replacement donors were the major source of blood for transfusion in most states in Nigeria. There is higher prevalence of malaria parasitaemia in family replacement donors when compared to voluntary blood donors, this result is in line with the report of Olawumi et al.20, however not statistically significant. The lower prevalence recorded in this study indicates that there is reduced risk of transmission of malaria when blood products are derived from voluntary donors. Result from this study shows a higher prevalence of parasitaemia in repeat donors when compared to first-time donors. This result is consistent with the report of Garba et al.16. This could be as a result of the fact that first-time donors are apprehensive and those having mild symptoms of malaria such as headache are usually excluded to donate blood.

The prevalence of malaria parasite in this study shows high rate among female donors when compared to male donors. The difference in prevalence between the genders may not be conclusive owing to the relatively small number of female donors who participated in the study. Higher prevalence of parasitaemia was found in donors whose age where below twenty and the least prevalence was seen in donors within the age range of 40-49 years of age. This result does not tally with the report of Ekwunife et al. (2011)6 who reported the highest prevalence among donors within the range of 25-29 and the least prevalence among donors within the age range of 50-54 years of age. The difference may be due to
chance. There is higher prevalence rate in single (unmarried) blood donors while malaria parasite was not detected in the blood of the divorced donor. The result does not tally with the report of Alli et al.,4 who reported a higher prevalence among married donors which might be probably by chance. Overall, there is no significant relationship between the prevalence of malaria infection and the usage of personal protection against mosquitoes. This indicates that the current prevalence of malaria parasite among the blood donors is not dependent on the use of insecticide and/or insecticide treated nets. The results also indicated that there is statistically significant relationship between the prevalence of malaria infection and treatment with anti-malaria drugs. This indicates that treatment with antimalarial drugs significantly reduces the prevalence of malaria among blood donors. This coincides with the report of UNICEF 21, which states that the two major ways to reduce the spread of malaria are the use of insecticide treated mosquito nets and early diagnosis and prompt treatment with antimalarial medications.

CONCLUSION

In conclusion the result from this study shows a progressive increase in the prevalence of malaria parasite among blood of donors attending UMTH when compared with previous results. This increase is alarming as these donors are apparently healthy subjects indicating an increased risk of transmission of malaria through transfusion in Maiduguri. No filarial worm was recorded in this study. No statistically significant relationship was established between malaria infection and the usage of Insecticide and/ or insecticide treated net. However, statistically significant relationship between the prevalence of malaria parasite and treatment with antimalarial drugs is noted.

Recommendations Haemoparasites can be transmitted through transfusion of infected blood derived from asymptomatic donors. This may negatively affect patient’s health and increase the duration of their illness. State government should improve the sanitary condition of Maiduguri and environs which will in turn reduce mosquito breeding sites. Screening donors for parasitic infections should be included in the current nation’s transfusion guidelines. Enlighten donors on better ways of preventing infections with haemoparasites. Encourage prompt and effective treatment of infected prospective donors. In additions incentives such as insecticide treated mosquito net, insect repellent and refreshments should be given to donors as this may encourage voluntary donation and as well reduce the prevalence of haemoparasites in the blood of donors.

REFERENCES


2. Medical Dictionary for the Health Professions and Nursing


tertiary health institution in south-west Nigeria. Journal of Dental and Medical Sciences, 13(1), 84-87.


