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Original Research Article

Prevalence of Haemoparasites among Blood Donors in Livingspring Hospital, Igbogbo, Ikorodu, Lagos

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Abstract

Background: Blood is an essential fluid of the body. Safety of blood and blood products is of global concern in transfusion medicine especially as it concerns the transfusion of transmissible infections (TTIs). ***Objective:*** This study was aimed to established the prevalence of haemoparasites in voluntary blood donors at Livingspring Hospital, Igbogbo, Lagos State. ***Methods:*** A cross-sectional study with a quantitative approach carried out on all voluntary blood donors during lockdown, 2020. Blood samples were collected from 100 donors into EDTA containers with age range 18-50 years. Donors were made up of 75 males and 25 females. Samples were processed using Giemsa techniques and were examined microscopically for haemoparasites. Descriptive and inferential analysis were carried out at $p<0.05$ significance level with 95% confidence interval. ***Results:*** The overall prevalence of haemoparasites among donors was established at the rate of 35% (35/100). Of the 100 donors, 35% were positive haemoparasites, of which 33% of the donors were positive for *Plasmodium falciparum* while 2% were positive for *Loa loa*. However, findings were statistically not significant ($p<0.05$). ***Conclusion:*** It is imperative to screen blood samples to ensure safety of complete patient healthcare and service delivery.

Keywords: Haemoparasites, Blood Donors, *Plasmodium falciparum*, *Loa loa*.

INTRODUCTION

A blood donor can be defined as one who gives blood for transfusion purposes. As a general rule, any adult who is in good health and has not recently had any serious illness is suitable as a donor. Every transfusion service has detailed regulations which slightly modify this general statement and which are designed either for the protection of the donor or the recipient [1]. The need for blood is great. Accident victims, people undergoing surgery and patients receiving treatment for leukaemia, cancer or other diseases, such as sickle cell disease and thalassaemia, all utilize blood. More than 23 million units of blood components in America are transfused every year. In most countries, strict regulations have been established for the selection of blood donors that incorporate criteria that serve to protect both the donors and recipients [2]. The donated blood is tested by many methods but the core tests recommended by the World Health Organization are these four: Hepatitis B Surface Antigen, Antibody to Hepatitis C, Antibody to HIV, usually subtypes 1 and 2 and Serologic test for Syphilis. Hepatitis B virus (HBV), Hepatitis C virus (HCV), human immunodeficiency virus (HIV) and syphilis are the most important lethal agents in transfusion transmitted infections (TTIs) and remain a large health care burden globally. The incidence rates across the world are difficult to calculate given the asymptomatic and often latent nature of these diseases prior to clinical presentation. Every blood transfusion therefore carries a potential risk for transmissible diseases [3].

Haemoparasite is a parasite that inhabits the bloodstream of the host or a parasitic animal that lives in the blood of a vertebrate. These parasites reside either in the blood cells or in the plasma. Malaria parasites 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 [4]. In Nigeria, malaria and filariasis are more prevalent and over the years varying prevalence has been recorded among Nigerian blood donors [5]. According to Agboola *et al.*, [6], haemoparasites

constitute a serious threat to human race as they can result in increased morbidity and mortality.

A blood transfusion is the transfer of blood or blood products from one person (donor) into another person's bloodstream (recipient). This is usually done as a lifesaving maneuver to replace blood cells or blood products lost through severe bleeding, during surgery when blood loss occurs or to increase the blood count in an anaemic patient [7].

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 [8]. These parasites are prevalent in Nigeria but the extent to which it currently affects blood donors attending Igbogbo community is unknown, we therefore, considered it necessary to contribute some information on this subject.

MATERIALS AND METHODS

Study Area

The study was carried out at the Livingspring Hospital, Igbogbo, Ikorodu. The hospital is a secondary health institution with a referral status to Hematology unit.

Target Population

This study was conducted at Igbogbo community, Ikorodu. The study comprised of hundred (100) subjects who are voluntary or family blood non-renumerated donors. The participants ranged from 18 to 50 years old, above 50kg in weight, and will show no clinical signs of fever or sickness. Additionally, female sex donors were non-pregnant, non- breastfeeding and non-menstruating.

Research Design

A cross-sectional survey on haemoparasites among volunteered blood donors comprising both sexes were carried out visiting Livingspring Hospital, Igbogbo, Ikorodu. All potential blood donors were informed about the nature and the objectives of the study, and personal and demogrographic data was recorded including the name, age, place of residence, type of blood donation (voluntary or family), level of study and profession with the use of informed consent.

Sample Collection

For each qualified donor participants, 2mL of venous blood was collected and dispensed into ethylenediamine tetra-acetic acid (EDTA) tube and was used provide the blood films are made soon after collecting the blood and thick films are handled with care to prevent the blood being washed from the slide during staining [9].

Inclusion Criteria

All consenting healthy donors in Igbogbo, Ikorodu, Lagos. This study included non-clotted blood samples collected from blood donor units which was stored for less than 35 days.

Exclusion Criteria

Potential donors will be excluded if they are: Below 17 years old and above 50 years of age, weight less than 50 kg, anaemic or have a history of jaundice, malaria, asthma, engage in high-risk behaviour (i.e., unsafe intercourse, drug abuse), have past history of HBV, HCV, HIV I & II or syphilis, or are apparently unhealthy or malnourished.

Laboratory Analysis

This study used Rapid diagnostic test and microscopic examination of blood sample for haemoparasites. For identification of mobile microfilaria, a drop of fresh blood was placed on a slide and mixed with a drop of physiological saline, and the preparation was then covered with a cover slide and examined microscopically. On the other hand, blood samples from each donor enrolled in the study was screened by direct microscopic (100×) visualization of Plasmodium parasites on thick blood smears stained with 10% Giemsa stain solution for 10 minutes. Trophozoite density in blood was determined using semi quantitative count method following a semi-quantitative scale. Slides were reported negative when no haemoparasites was detected in 100 fields of each thick smear. A sample with known high number of haemoparasites trophozoite was used as positive control [9].

Data Analysis

The data collected from the study area were entered in Microsoft office excel 2016 before being imported to SPSS version 23 was employed for data entry for descriptive and inferential statistical analysis. Statistical significance of differences in proportions was evaluated by Chi-Square test with significant value of $p<0.05$ used for all tests.

Quality Control

Standard operating procedures for Giemsa stain were followed. The stain was quality controlled using known positive and negative control slides. Wet and stained thick and thin blood preparations were double checked by second laboratory personnel.

Ethical Consideration

An introduction letter and recommendation letter were obtained from the University, which was presented to the Management Livingspring Hospital and Union Diagnostic Laboratory. Participation in the study was also voluntary after an informed consent.

Laboratory numbers were used to identify the donors and the date. Results were handled with maximum privacy and confidentiality throughout the study.

RESULTS

The present descriptive cross-sectional study enrolled 100 Blood donors age ranged 18-49 yrs living within Igbogbo community, Ikorodu, Lagos State. A total of 35 donors were positive (35%) for haemoparasites of which 33% positive cases had malarial infection and 2% donors were positive for filariasis respectively. However, coinfection was observed in one donor.

In relation to social demographics, though not statistically significant, Male had the highest prevalence. Donors within age range of 26-33 had the highest prevalence while those within the age range of 42-49 had the least prevalence of haemoparasites present in their blood. Single had the highest prevalence when compared to the married (Table 1).

Table 1: Prevalence of Haemoparasites in Relation to Social Demographics

Demographics	Numbers Tested	Numbers Positive (%)	*p*-value
Gender			
Male	75	30(40)	0.932
Female	25	5(20)	
Age (yrs)			
18-25	40	14(35)	
26-33	35	15(43)	0.083
34-41	15	4(27)	
42-49	10	2(20)	
Marital Status			
Single	64	24(37.5)	0.897
Married	36	11(30.5)	

Haemoparasites among the ABO blood group has its highest prevalence rate of 45.7% among donors with O blood type and the least prevalence of 17.1% with B blood type. AB blood group appeared negative for haemoparasites. In relation to Rh blood type, haemoparasites was more prevalent in donors with Rh "D" (+) blood group. This relationship was not statistically significant ($p>0.05$) (Table 2).

Table 2: Prevalence of Haemoparasites in Relation to Blood Groups of Donors

Number Examined	Haemoparasites Positive (%)	ABO Factor	*p*-value
47	16(45.7)	O	0.076
25	13(37.1)	A	
25	6(17.1)	B	
3	0(0.0)	AB	
Total	**35(100.0)**		
Number Examined	**Haemoparasites Positive (%)**	**Rh Group**	***p*-value**
94	35(37.0)	Rh Positive	0.065
6	0(0)	Rh Negative	
Total	**35(100.0)**		

DISCUSSION

Haemoparasites among blood donors has been a recurring episode in Africa and also back home in Nigeria. Most of these haemoparasites have been overlooked or neglected because of the lack of capacity to carry out adequate and proper screening during blood donor screening.

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 or filarial worms 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 [8]. These parasites are prevalent in Nigeria but the extent to which it currently affects blood donors attending Igbogbo Ikorodu, Lagos is unknown, we therefore, considered it necessary to contribute some information on this subject.

The present descriptive cross-sectional study enrolled 100 Blood donors aged 18-49years who are living within Igogbo community, Lagos State. In Overall, 35 donors were positive (35%) for haemoparasites of which 33 of these positive cases had malarial infection, 2 donors were positive for filariasis showing a prevalence of 33% and 2% respectively. However only one donor tested positive for both infections. The prevalence of malaria parasitaemia in this study was lower than that reported by Abioye *et al*.,

[10] who recorded a prevalence rate of 56% (140/250) in Abuja and was higher than the report of Garba *et al*., [11] who reported a prevalence of 7.5% (27/360) in Kaduna. In relation to filarial worms the result from this study was in congruent with the report of Bolaji *et al*., [4] but inconsistent with findings from Alhaji *et al*., [12]. These differences in regional prevalence could be attributed to variation in predisposing factors such as present of Anopheles species, environmental conditions, climatic conditions, study period, the study population and diagnostic test method used.

The prevalence of haemoparasites in this study shows a double fold increased rate in male donors (40%) compared to the female gender (20%). This was in line with Omisakin *et al*., [13] but inconsistent with study by Alhaji *et al*., [12]. This observation in the findings was due to the relatively small number of female donors who participated in the study. This finding was not statistically significant (p>0.05).

Among age group distribution, Ekwunife *et al.,* [8] and Okocha *et al.,* [14] both reported a highest prevalence among donors within the range of 25-29 and 26-33 yrs and the least prevalence haemoparasites among donors within the age range of 50-54 and 42-49 yrs.

More so, there was a higher prevalence rate in single (unmarried) blood donors compared to the married. This result is not in accordance with the reports by Alli *et al*., [5] who reported a higher prevalence among married donors which might be probably due to chance.

This study further revealed that haemoparasites in respect to ABO blood group, has its highest prevalence rate of 52% among donors with A blood type. This result is not in line with the reports by Agboola *et al*., [6] and Alhaji *et al*., [12] who both reported higher prevalence among blood group O and B donors respectively. This discrepancy may be as a result of chance or coincidence. In relation to Rh blood type, haemoparasites was more prevalent in donors with Rh "D" (+) blood group. This finding was similar to a report by Olawumi *et al*., [15] 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 parasitaemia is independent of a person's Rh "D" blood group.

Interestingly, only two participants were positive for *Loa loa*. This might be due to the fact that both donors are indigenes of the northern part of Nigeria as seen in the structured questionnaire and reports from the north shows a relatively high prevalence of filariasis when compared to the southwest region [12].

CONCLUSION

The result from this study shows a progressive increase in the prevalence of malaria parasite among blood of donors in Igbogbo, Ikorodu, Lagos state 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 Igbogbo metropolis. It may be justifiable for recipients of blood transfusion particularly neonates, children and pregnant women in malaria-endemic environment to be routinely treated with antimalarial drugs as a prophylactic measure.

RECOMMENDATIONS

Currently, laboratory screening of blood donors for the haemoparasites is not routinely available in Nigerian Health Institutions. The use of other serological and molecular methods for further reducing the residual risk, such as the enzyme-linked immunosorbent assay (ELISA); polymerase chain reaction (PCR) system; immunofluorescence assays can provide more effective blood safety. It is imperative that more studies be carried out to breach the gap to provide vital information to the blood transfusion organization in preparing appropriate blood screening programs for haemoparasites. However, there should be a mandatory universal donor-screening policy for malaria and the exclusion of blood donors with malaria parasitaemia to further enhance blood safety in our environment. Similarly, the Ministry of Health (Nigeria) ought to put in place sensitization programs about the causes, modes of transmission and preventive measures of haemoparasites in order to increase the level of awareness among the general population.

CONFLICT OF INTEREST

Authors declared no conflict of interest.

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REFERENCES

1. Ranney, H. M., & Rapaport, S. I. (2010). The Red Blood Cell. *Best and Taylor's Physiological Basis of Medical Practice*, *15*(5), 369-384.
2. Huestis, D.W., Busch, S. (2010). Selection of Blood Donors. In: Practical Blood Transfusion, Huestis DW, JR. Bove & S. Busch. *2nd Edition Little Brown and Company*, *13*, 7-48.
3. Bhawani, Y., Rao, P. R., Sudhakar, V. (2010). Seroprevalence of transfusion transmissible infections among blood donors in a tertiary care hospital of Andhra Pradesh. *Biol Med*, *2*(4), 45-48.
4. Bolaji, O. S., Uthman-izobo, S. O., Ojurongbe, O., Opaleye, O. O., & Adeyeba, O. A. (2014). Filariasis among asymptomatic blood donors in general hospital, Odan Marina-Lagos, Nigeria. *International Journal of Research in*

Applied, Natural and Social Sciences, *2*(6), 177-182.

5. Alli, J. A., Okonko, I. O., Abraham, O. A., Kolade, A. F., Ogunjobi, P. N., Tonade, O. O., Ojezele, M. O., & Nwanze, J. C. (2010). A serosurvey of blood parasites (Plasmodium, Microfilaria, HIV, HBsAg, HCV antibodies) in prospective Nigerian blood donors. *Research Journal of Medical Sciences*, *4*(4), 255-275.
6. Agboola, T. F., Ajayi, M. B., Adeleke, M. A., & Gyang, P. V. (2010). Prevalence of malaria parasite among blood donors in Lagos University Teaching Hospital, Lagos Nigeria. *Annals of Biological Research*, *1*(3), 72-75.
7. Kleinman, S. H., Williams, J. D., Robertson, G., Caglioti, S., Williams, R. C., Spizman, R., Morgan, L., Tomasulo, P., & Busch, M. P. (2009). West Nile virus testing experience in 2007: evaluation of different criteria for triggering individual-donation nucleic acid testing. *Transfusion*, *49*(6), 1160-1170.
8. Ekwunife, C. A., Ozumba, N. A., Eneanya, C. I., & Nwaorgu, O. C. (2011). Malaria infection among blood donors in Onitsha urban, Southeast Nigeria. *Sierra Leone Journal of Biomedical Research*, *3*(1), 21-26.
9. Cheesbrough, M. (2006). Microbiological tests. In: District Laboratory Practice in Tropical Countries. Cambridge Low-Price Editions, *1st edition*, *University Press. Cambridge*, pp. 245, 256.
10. Abioye, J. O. K., Abdullahi, D. K., Alalade, O. M., & Olokun, A. L. (2015). Incidence of malaria parasite in blood donors at Kwali General Hospital, FCT Abuja. *Journal of Emerging Trends in Engineering and Applied Sciences*, *6*(3), 212-216.
11. Garba, D. D., Ameh, J. B., Whong, C. M., & Aminu-Mukhtar, M. (2016). Prevalence of malaria parasites among blood donors in Kaduna, Nigeria. *Int J Res Med Sci*, *4*(6), 2112-2119.
12. Alhaji, B., Ann, M., Umeh, A., Osita, O. S., Gimba, W., Nwobi, A., Osareniro, O. E., & Awortu, J. Z. (2014). Prevalence of haemoparasites (Plasmodium and Microfilaria) in Blood Donors Attending University of Maiduguri Teaching Hospital (UMTH). *Res J Med Sci*, *65*(3), 34-38.
13. Omisakin, C., Esan, A., Bola, O., & Owoseni, M. (2014). Prevalence of filarial worm among prospective blood donors attending a tertiary health institution in Southwest Nigeria. *IOSR J Dental Med Sci*, *13*(1), 84-87.
14. Okocha, E. C., Ibeh, C. C., Ele, P. U., & Ibeh, N. C. (2005). The prevalence of malaria parasitaemia in blood donors in a Nigerian teaching hospital. *Journal of Vector Borne Diseases*, *42*(1), 21-24.
15. Olawumi, H. O., Fadeyi, A., Babatunde, S. K., Akanbi II, A. A., Babatunde, A. S., Sani, M. A., & Aderibigbe, S. A. (2015). Malaria parasitaemia among blood donors in Ilorin, Nigeria. *African journal of infectious diseases*, *9*(1), 10-13.