Haematological Parameters in Prospective Nigerian Blood Donors Rejected on Account of Anaemia and/or Microfilaria Infestation

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ABSTRACT

Background: Worldwide, prospective blood donors are screened for blood transfusion-transmissible diseases. In addition, pre-donation fitness requires adequate haematocrit and, in the tropics, negative screening for microfilaria that may precipitate allergy. The high prevalence of anaemia and microfilaria, though treatable, has contributed to the dearth of eligible blood donors. This study aims to characterize anaemia in prospective blood donors rejected for anaemia and find haematological effects of microfilarial infestation in prospective blood donors.

Methods: This prospective study was carried out from 1st of August to November 30th, 2002 at the blood transfusion unit of the Haematology Department of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife. All consenting prospective blood donors that were rejected for anaemia and or microfilaria infestation during the study period were studied for their age, sex and haematological profile. A randomly selected population of successful donors was similarly studied.

Results: Sixty rejected prospective blood donors (5.2% of the total screened)) were studied. Forty-five (75%) of them were rejected for anaemia alone, 10 (16.7%) for microfilaria alone and 5 (8.3%) for both anaemia and microfilaria. The mean ages of those rejected were 33.3(±9.9) years for anaemia alone, 29.9(±8.5) years for microfilaria alone and 35.4(± 8.3) years for those with anaemia and microfilaria combined. The mean age of the successful group was 28.9(±8.5) years. Of the 60 rejected subjects, 53 were males while 7 were females. Blood film of the anaemia group revealed features suggestive of iron deficiency anaemia (hypochromic microcytic cells) in 60% of them. The white cell count (WCC) was significantly increased in the microfilarial group compared to others and it revealed lymphocytosis and eosinophilia.

Conclusion: The importance of these findings have been discussed in line with the existing literature. The need for intensive health education to encourage voluntary donation and promote the interest of females in blood donation is emphasized.

KEYWORDS: Haematological parameters; Nigerian donors; Anaemia; Microfilaria.

INTRODUCTION

Blood and blood products transfusion is generally accepted in modern medical practice as a life saving measure, although, there is a minority view against it on religious basis (sectorial perception of Biblical verses-Genesis 9:3-4, Leviticus 17:13-14 and Acts 15:19-21). Despite all technological breakthroughs in transfusion medicine, humans remain the most important source of blood and blood products. To ensure safety of blood transfusion, prospective donors worldwide are screened for blood transfusion-transmissible diseases, the prevalence of which are variously reported in different societies. In West African countries, the prevalence of blood-borne infectious diseases like Hepatitis B and C viruses, Human immunodeficiency virus and human t-cell lymphotropic virus type 1 is so alarming[1-4] to warrant pre-donation screening to minimize wastage. This desirable exercise generally results in a dearth of suitable blood donors[5] but much more so in countries with Low Human Development index (HDI) typified by most African countries[6] where mandatory screening for anaemia and microfilaria further contributes to lean donor pool. Anaemia and microfilarial infestations are treatable conditions. An attempt to address these two conditions in the donor population would no doubt boost the population of eligible donors. This study is therefore designed to characterize anaemia in

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rejected prospective blood donors and find haematological effects of microfilarial infestation in the same population.

MATERIALS AND METHOD

Sixty successive prospective blood donors that were rejected between August and November 2002 either on account of anaemia (packed cell volume <0.38L/L) or microfilarial infestation or both on presenting for pre-donation test at the Blood transfusion unit of the Haematology Department of Obafemi Awolowo University Teaching Hospitals' Complex (OAUTHC), Ile-Ife were studied after informed consent. The parameters studied include the age, the sex, haematological profile, namely, the packed cell volume (PCV), white cell count (WCC) and differentials, and platelet count using manual methods[7] and blood film reading using standard method[8], and determination of microfilarial status using wet blood film[9]. Forty successful prospective blood donors were similarly studied as control. The total number of prospective blood donors that presented during the study period was also noted. Venous blood samples, at least 3 milliliters from each patient, was collected into Ethylene-Diamine Tetra-acetic acid (EDTA) – containing bottle under aseptic condition for blood cell count and blood film. Statistical analysis was done with Statistical Package for Social Sciences version 10(SPSS 10) to get the means of the variables. Test for significance between the means of corresponding variables was determined using independent t-test with statistical significance set at $P<0.05$.

RESULTS

During the study period 1,135 prospective blood donors were screened for anaemia (PCV <38%) and presence of microfilaria on wet film preparation. A total of 60 of them (5.3%) were rejected on the two grounds. Forty-five (75%of the rejected) were rejected for anaemia (PCV <38%) alone, 10 (16.7%) were rejected for microfilaria alone and 5 (8.3%) were rejected on account of both.

The mean age of those rejected for anaemia was 33.3 (±9.9) years. That of the microfilarial positive patients was 29.9 (±8.3) years while that of the group rejected for both anaemia and microfilarial positivity (combined) was 35.4 (±8.3) years. The mean age of the successful group was 28.9 (±8.5) years.

The sex distribution of the prospective blood donors studied revealed 53 unsuccessful males and 7 unsuccessful females. Twenty-eight and 12 successful males and females respectively were similarly studied as controls.

The means (±SD) of parameters studied and the result of comparison of the means in pairs of groups (Anaemic group/Normal, Microfilarial group/Normal, Anaemic and microfilarial combined/Normal, anaemic group/microfilarial group, using independent paired samples tests, are as presented in Tables I to V.

Table I. Comparing Means of Variables in Anaemic Donors and Control

	Diagnosis	Mean ± S.D	P value
Age (yrs)	Anaemic	33.3± (9.9)	< 0.05
	Normal	28.9 ± (8.5)	(0.028)*
Haematocrit in %	Anaemic	35.9 ± (2.6)	< 0.05 (0.001)
	Normal	43.7 ± (3.8)	
Platelet count (x10⁹/l)	Anaemic	234.2 ± (440.6)	> 0.05 (0.590)
	Normal	198.0 ± (75.5)	
White cell count (x10⁹/l)	Anaemic	4.9 ± (1.4)	< 0.05 (0.022)
	Normal	5.7 ± (1.6)	
Neutrophil in %	Anaemic	46.1 ± (9.8)	> 0.05 (0.852)
	Normal	46.5 ± (8.0)	
Basophil %	Anaemic	1.0 ± (0.0)	< 0.05 (0.018)
	Normal	1.4 ± (0.5)	
Lymphocyte in %	Anaemic	50.9 ± (9.9)	< 0.05 (0.4667)
	Normal	49.4 ± (8.3)	
Monocyte in %	Anaemic	1.2 ± (0.4)	> 0.05 (0.146)
	Normal	1.5 ± (0.8)	

*Actual P-value

Table II. Comparing Means of Variables in Donors with Microfilaria Only and Control (Normal Donors)

	Diagnosis	Mean + S.D	P value
Age (yrs)	Microfilaria	29.9 ± (8.3)	>0.05 (0.734)
	Normal	28.9 ± (8.5)	
Haematocrit in %	M.F	43.9 ± (2.3)	>0.05 (0.835)
	Normal	43.7 ± (3.8)	
Platelet (x10⁹/l)	M.F	148.4 ± (22.3)	<0.05 (0.001)
	Normal	198.0 ± (75.5)	
White cell count (x10⁹/l)	M.F	6.2 ± (1.9)	>0.05 (0.734)
	Normal	5.7 ± (1.6)	
Eosinophil %	M.F	10.9 ± (7.6)	>0.05 (0.835)*
	Normal	3..0 ± (1.6)	
Basophil in %	M.F	1.3 ± (0.5)	<0.05 (0.001)
	Normal	1.4 ± (0.5)	
Lymphocyte in %	M.F	63.5 ± (9.3)	>0.05 (0.485
	Normal	49.4 ± (8.3)	<0.05 (0.010)
Monocyte in %	M.F	2.0 ± (-)	>0.5 (0.844)
	Normal	1.5 ± (0.8)	
Neutrophil in %	M.F	25.0 ± (7.6)	<0.05 (0.001)
	Normal	46.5 ± (8.0)	

*Actual P-value

Table III. Comparing Means of Variables in Donors with both Anaemia and Microfilaria and Control

	Diagnosis	Mean ± S.D	P value
Age in years	Both anaemia & M.F	35.4 ± (8.3)	>0.5
	Normal	28.9 ± (8.5)	(0.157)*
Haematocrit in %	Both anaemia & M.F	33.0 ± (2.8)	>0.05
	Normal	43.7 ± (3.8)	(0.00)*
Platelet (x10⁹/l)	Both anaemia & M.F	150.6 ± (33.1)	>0.05
	Normal	198.0 ± (75.5)	(0.031)
White cell count (x10⁹/l)	Both anaemia & M.F	6.4 ± (0.3)	<0.05
	Normal	5.7 ± (1.6)	(0.010)
Neutrophil in %	Both anaemia & M.F	24.0 ± (11.3)	<0.05
	Normal	46.5 ± (8.0)	(0.010)
Eosinophils in %	Both anaemia & M.F	10.0 ± (5.2)	>0.05
	Normal	3.0 ± (1.6)	(0.38)
Basophil in %	Both anaemia & M.F	1.5 ± (0.7)	>0.05
	Normal	1.4 ± (0.5)	(0.857)
Lymphocyte in %	Both anaemia & M.F	65.8 ± (0.4)	<0.05
	Normal	49.4 ± (8.3)	(0.022)
Monocyte in %	Both anaemia & M.F	-	-
	Normal	1.5 ± (0.8)	

*Actual P-value

Table IV. Comparing Means of Variables in Donors with Anaemia and Microfilaria Only

	Diagnosis	Mean ± S.D	P value
Age in years	Anaemia	33.3 ± (9.9)	>0.05(0.272)
	Microfilaria	29.9 ± (8.3)	
Haematocrit in %	Anaemia	35.9 ± (2.6)	<0.05(0.00)
	Microfilaria	43.9 ± (2.3)	
Platelet (x10^9/l)	Anaemia	234.2 ± (440.06)	<0.05(0.020)
	Microfilaria	148.4 ± (22.3)	
White cell count (x10^9/l)	Anaemia	4.9 ± (1.4)	<0.05(0.082)
	Microfilaria	6.2 ± (1.9)	
Neutrophil in %	Anaemia	46.1 ± (9.8)	<0.05(0.00)
	Microfilaria	25.0 ± (7.6)	
Eosinophils in %	Anaemia	2.7 ± (1.5)	<0.05(0.07)*
	Microfilaria	10.9 ± (7.6)	
Lymphocyte in %	Anaemia	50.9 ± (9.9)	<0.05(0.020)*
	Microfilaria	63.5 ± (9.3)	
Monocyte in %	Anaemia	-	-
	Microfilaria		
Basophil in %	Anaemia	1.0 ± (0.0)	<0.05(0.175)
	Microfilaria	1.3 ± (0.5)	

*Actual P-value

Table V. Comparing Means of Variables in Donors with Anaemia and Both (Anaemia and Microfilaria)

	Diagnosis	Mean ± S.D	P value
Age in years	Anaemia	33.3 ± (9.9)	>0.05(0.624)
	A & M	35.4 ± (8.3)	
Haematocrit in %	Anaemia	35.9 ± (2.6)	<0.05(0.082)
	A & M	33.0 ± (2.8)	
Platelet (x10^9/l)	Anaemia	234.2 ± (440.06)	<0.05(0.0220)
	A & M	150.6 ± (33.1)	
White cell count (x10^9/l)	Anaemia	4.9 ± (1.4)	<0.05(0.00)
	A & M	6.4 ± (0.3)	
Neutrophil in %	Anaemia	46.1 ± (9.8)	<0.05(0.01)
	A & M	24.0 ± (11.3)	
Eosinophils in %	Anaemia	2.7 ± (1.5)	<0.05(0.033)
	A & M	10.0 ± (5.2)	
Basophil in %	Anaemia	10.0 ± (5.2)	>0.05(0.055)*
	A & M	1.5 ± (0.7)	
Lymphocyte in %	Anaemia	50.9 ± (9.9)	<0.05(0.029)
	A & M	65.8 ± (10.4)	
Monocyte in %	Anaemia	-1.2 ± (0.4	-
	A & M	-	

*Actual P-value   A & M = Anaemia and Microfilaria

DISCUSSION

Going by World Health Organization (WHO) Global Database for Blood safety and the United National Development Programme (UNDP) Human Development Index (HDI) classification of countries into low HDI, medium HDI or high HDI, based on contribution to global safe blood pool, most African countries belong to low HDI or medium HDI where only 40% of the global blood supply is donated[6]. Coincidentally, these are countries where more than 60% of global blood supply is consumed

for high prevalence of severe chronic anaemia especially in children, high rate of obstetrical complications and high rare of road traffic accidents[4,10,11]. The failure to meet the demand for safe blood results from scarcity of eligible donors occasioned by high rate of disqualification of prospective donors for infectious diseases[1-3]. The mandatory exclusion of anaemic prospective donors and those infected with microfilaria further depletes the population of eligible donors. In this study, 5.3% of prospective donor population was rejected on the ground of anaemia and or microfilarial infestation; 4% for anaemia, 0.9% for microfilaria and 0.4% for anaemia and microfilaria combined. The major cause of the anaemia as suggested by the blood film finding of hypochromic microcytic cells in 60% of the patients is iron deficiency anaemia, which is known to be the commonest anaemia worldwide[12] and correctable by necessary nutritional supplementation. But for the ease with which it can be identified, the finding of 0.9% prevalence of microfilarial infestation would suggest low prevalence in this environment and therefore of less importance in blood banking services.

It is noteworthy that there was significant difference in the mean ages of the anaemic group and the successful donors: the successful donors were younger than the anaemic group, although they were all within the recommended age for eligible donors[12] (Table I). It is therefore inferable that the younger a donor the better provided the minimum age limit is met. However, typical of low HDI characteristics[6], there was sex bias in favour of males as the population of female donors was negligible compared to male donors. This is a reflection of gender inequality syndrome characteristic of under-developed countries. The mean haematocrit in the anemia group was 35.9 (±2.6%) while that of normal group was 43.7 (±3.8%). The difference is statistically significant (Table I). This is in keeping with standard blood banking services as it is the general practice not to bleed a prospective donor with haematocrit <38%[13,14]. When compared to successful donors, all parameters were within the normal limits except haematocrit. Even the significantly lower WCC and Basophil count in

the anaemia group compared to normal donors have value within normal range[7,8] (Table I). It is therefore inferable that by treating the anaemia in the anaemic group, they would be as good as successful donors. Similar observation had been made before[15] with good result.

The microfilarial group had significantly lower mean platelet counts but higher eosinophils and lymphocytes when compared to normal donor and anaemic groups (Tables II, III, IV, V). The mean platelet count in microfilarial group, although lower than those in normal donor and anaemic groups, is still within the normal range[16]. The relative thrombocytopaenia in microfilarial group might be due to possible bone marrow infiltration by microfilariae[17] and consequent marrow depression. The recorded eosinophilia and lymphocytosis in the microfilarial group conform with the characteristic findings in parasitic infestations especially in the tropics[18].

CONCLUSION

Anaemia, mostly nutritional and microfilarial in prospective blood donors , is treatable, and if given deserved medical attention, would improve our blood donation drive. Public enlightenment campaign with special attention to the women folk would go a long way in boosting the blood donor pool.

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