Original Article

The Relationship between Donor Deferral and Seropositivity of Transfusion-transmissible Infections: Implication for Transfusion Services in the University of Calabar Teaching Hospital, Calabar

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Abstract

Introduction: Providing adequate and safe blood has remained a daunting challenge to medical practice, especially in sub-Saharan Africa. **Objectives:** The objectives of this study were to identify the common reasons for donor deferrals and to determine the seroprevalence of common transfusion-transmissible infections (TTIs) at the University of Calabar Teaching Hospital (UCTH), Calabar. **Materials and Methods:** This is a retrospective study. Data of blood donors between June 2016 and August 2017 were obtained from the donor registry of the blood bank and analyzed using Microsoft Excel sheet. **Results:** Reactive test for TTIs and suboptimal packed cell volume (PCV) were the most common reasons for donor deferrals in UCTH, Calabar. A total of 12.3% of potential donors were deferred mainly due to positive screening test for TTIs and suboptimal PCV. The seroprevalence for hepatitis B, hepatitis C, human immunodeficiency viruses, and syphilis was 2.9%, 2.8%, 1.5%, and 2.5%, respectively. **Conclusion:** Seropositivity for TTIs and suboptimal hematocrit levels were the major reasons for donor deferrals in UCTH, Calabar.

Keywords: Donor deferrals, seroprevalence, transfusion-transmissible infections

Introduction

The attainment of donor blood sufficiency and safety has remained an onerous task in our environment.[1] Voluntary blood donation has been adjudged the safest source of donor blood procurement; however, they are limited and cannot sustain the blood requirement of medical practice in most facilities in Nigeria.[2] Most centers have resorted to replacement and paid donors in some instances to meet the increased demand for blood and blood products.[2,3] In a number of cases, paid donors may even disguise themselves as replacement donors. The inability to maximize every unit of donated blood by separating it into component further worsens the challenge of providing adequate blood.

The nonvoluntary donor blood procurement is saddled with an increased risk of transfusion-transmissible infections (TTIs). This is worsened in settings like ours where improved safety practices such as use of leukodepleted blood, blood product irradiation, pathogen inactivation techniques, and nucleic acid testing methods are lacking.

This study seeks to analyze the blood donation practice in the University of Calabar Teaching Hospital (UCTH), with a view to identify reasons for donor deferrals, the seroprevalence of TTIs in our donor populace. This is intended to make suggestions that will increase our donor blood procurement.

Materials and Methods

This was a retrospective study conducted at UCTH, Calabar. Data of blood donors between June 2016 and August 2017

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were obtained from the donor registry for analysis. The facility is mainly dependent on replacement donations and voluntary donor blood sourced mainly from the national blood transfusion services Calabar unit. The blood donation eligibility criteria include age range of 18–60 years, weight >50 kg, absence of any high-risk behavior, medical or physiological status that may endanger the donor or recipient, and packed cell volume (PCV) of 40% irrespective of the sex. The donors were screened for four common TTIs, namely, hepatitis B virus, hepatitis C virus (HCV), human immunodeficiency virus (HIV), and *Treponema pallidum* (syphilis) using enzyme-linked immunosorbent assay-based rapid kits. Two different kits were used for the HIV screening, and if any was reactive, the donor was deferred. The donors were screened for ABO and rhesus D blood group status. Donors who were not group compatible with potential recipient may be bled while a group compatible unit is given to potential recipient.

Data obtained include the number of donors screened during the study period, their sex, age PCV, screening outcome for TTIs, number of donors declared fit, and bleed. Those not fit to donate are counseled based on the identified reason for deferral. Temporary deferred donors such as those due to low PCV were counseled on how to improve their PCV while those with very low PCV were referred to the hematologist for treatment. Those deferred on account of TTI were referred to the appropriate clinic for management.

The results were analyzed using Microsoft Excel sheet and expressed in frequencies and percentages.

Results

A total of 2695 donors were screened during the study period (June 2016–August 2017) giving an average of 192 donors per month. Majority (53.3%) of the donors were within the age range of 29–38 years as shown in Figure 1. Two thousand two hundred and eighty-one of them were males (84.6%) with a male-to-female ratio of 7:1 as shown in Figure 2.

Replacement donors account for the highest proportion of donors and account for 1198 (44.5%), and this represented the highest proportion of blood donors. Voluntary donors were the least proportion, accounting for 599 (22.2%) as shown in Table 1. Two thousand three hundred and sixty-two (87.9%) of the donors were found fit to donate as shown in Figure 3.

Three hundred and thirty-two (12.3%) donors were unfit for blood donation and were deferred. Reasons for deferral include suboptimal PCV alone in 71 (21.4%), seropositivity for TTI in 186 (56.0%) donors, and combination of suboptimal PCV and TTIs in 75 (22.6%)

Seventy-five donors tested positive for hepatitis B surface antigen (HBsAg) giving a seroprevalence rate of 2.8%, 78 (2.9%) donors were positive for hepatitis C antibodies, 67 (2.5%) were positive for venereal disease research laboratory (*Treponema pallidum* antibodies), and 44 (1.5%) were positive for HIV antibodies in Table 2.

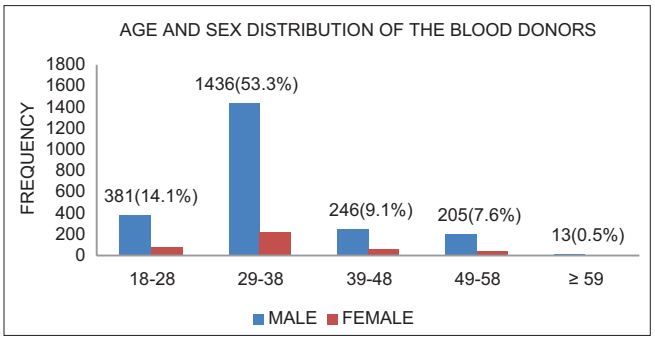

Figure 1: Age distribution of the donors

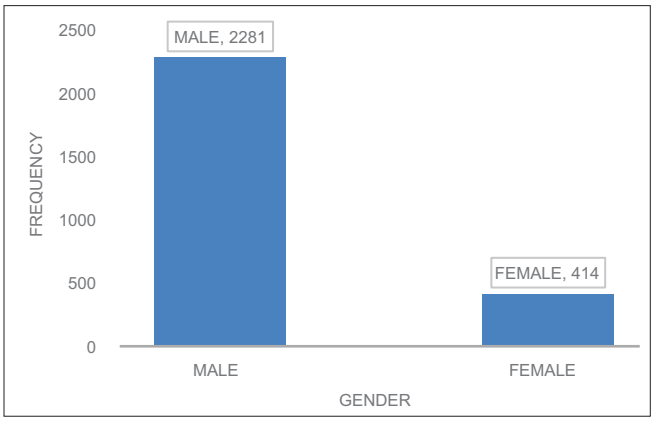

Figure 2: Gender distribution of the blood donors

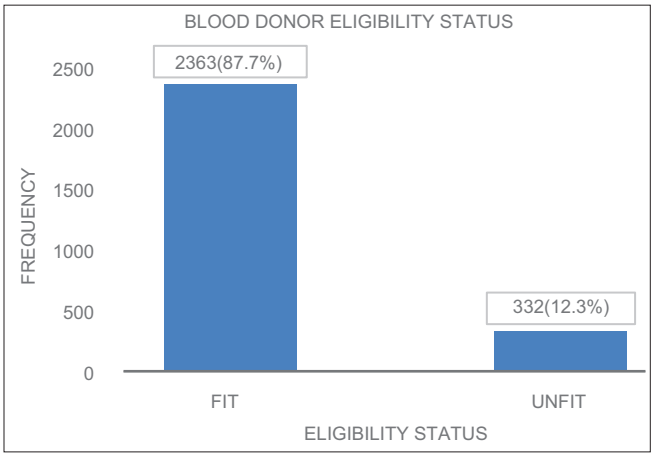

Figure 3: Eligibility of the donors

Table 3 shows the distribution of seropositivity for TTI based on age group distribution of donors. The highest proportion of TTIs was reported in donors between 29 and 48 years.

Discussion

This study has shown that UCTH, Calabar, has predominantly a male donor population accounting for 84.6%. This is similar to the observations of most other researchers in different parts of Nigeria and the world.[4-8] The male-to-female ratio of donor populace may vary from one location to another,

Table 1: Types of blood donors

Types of donors	Frequency (%)
Remunerated	898 (33.3)
Voluntary	599 (22.2)
Replacement	1198 (44.5)
Total	2695 (100.0)

Table 2: Prevalence of transfusion-transmissible infections

TTIs	Frequency (%)
HBsAg	75 (2.8)
Hepatitis C antibodies	78 (2.9)
VDRL (syphilis)	67 (2.5)
HIV	41 (1.5)
Total	261 (9.7)

TTIs: Transfusion-transmissible infections, HIV: Human immunodeficiency virus, HBsAg: Hepatitis B surface antigen, VDRL: Venereal disease research laboratory

Table 3: Age group distribution of transfusion-transmissible infection in donors

Age range	HBsAg (%)	HCV (%)	HIV (%)	Syphilis (%)	Total
18-28	14 (18.7)	19 (24.4)	4 (9.8)	6 (9.0)	43 (16.5)
29-38	38 (50.7)	12 (15.4)	11 (26.8)	22 (32.8)	83 (31.8)
39-48	12 (16.0)	25 (32.1)	12 (29.3)	26 (38.8)	75 (28.7)
49-58	9 (12.0)	18 (23.1)	8 (19.5)	12 (17.9)	47 (18.0)
≥58	2 (2.7)	4 (5.1)	6 (14.6)	1 (1.5)	13 (5.0)
Total	75 (2.8)	78 (2.9)	41 (1.5)	67 (2.5)	261 (100)

HIV: Human immunodeficiency virus, HBsAg: Hepatitis B surface antigen, HCV: Hepatitis C virus

but it is worth mentioning that the male-to-female ratio observed in this study is astronomically high compared to other African-based studies[4-7] and the WHO global report.[8] However, this is consistent with most studies in Nigeria that have reported values in the range of 85.1%–99.6%.[1,9-12] The reason for male dominance is partly because a common minimum hematocrit (39%) requirement is adopted for both male and female intending donors in Calabar. The universally acceptable hemoglobin requirement for blood donation is 13 g/dl for males and 12 g/dl for females (This translates to a PCV of 39% and 36% for males and females, respectively).[8] The adoption of a common hematocrit for both sexes may grossly limit females from donating bloods and over time may have discouraged female donors. Burden of the regular female menstrual cycle, childbirth, and suboptimal nutrition on the hematologic system of women further limits their capacity to attain sufficient hematocrit for blood donation.

Majority of the donors were in the age range of 29–38 years (53.3%). This differs from the WHO report which showed 45% of donors were aged 25 years or less[13] but similar to that of a study done in South West Nigeria by Buseri *et al*.[9] This may reflect the inadequate sensitization program on the blood donation in early adulthood. It may also reflect the type/goal of the donors which predominantly were replacement and remunerated donors in this setting.

Contrary to the WHO directives that blood donation should be completely voluntary,[14] the center recorded only 22.2% of voluntary donation during the period. This proportion is grossly insufficient to meet the blood demands of the hospital. In our setting, replacement and remunerated donations still play important roles in addressing blood insufficiency and should not be jettisoned in a hurry despite the inherent risk associated with them. While other measures to increase blood sufficiencies such as blood component therapy and rational blood use are being implemented, there should be increased campaign for voluntary donations. The replacement/remunerated donor population should be counseled and possibly converted and retained as voluntary donors.

Seropositivity for the major TTI (HIV, HBsAg, HCV antibodies, and syphilis) and suboptimal hemoglobin levels were the major reasons for donor deferrals. The seroprevalence of HBsAg was found to be 2.8%. The prevalence rate of HBsAg obtained from this study was lower than rates reported in a number of studies in other regions of Nigeria[9,13,15,16] but higher than rates reported in some other countries.[17] The relatively low value in this study should be due to high vaccination rates and improved behavioral practices that reduce risk of transmission in the general population. It is important to establish a protocol of referral and management of seropositive individuals.

The seroprevalence of HCV antibodies was 2.0%. Similar rate was reported by Koate *et al*.[18] and Wansbrough-Jones *et al*. (2.8%)[19] in Port Harcourt and Ghana, respectively. Another Port Harcourt-based study reported higher value of 5.0%. Other institutional-based study reported rates ranging from 6% to 12.3%.[20-22] Variation in seroprevalence rate may in part be due to varying precision and accuracy of the assay kits. Very sensitive kits tend to report higher values. With increased awareness of the disease, it is expected that rates will decline hence older studies conducted when awareness was relatively low recorded higher prevalence. The youths (18–48 years' age group) had the highest rate. This finding is in agreement with studies of Baba *et al*.[13] and Ejele *et al*.[23] This age group is more energetic and tends to exhibit high-risk behavior (prostitution, drug use, etc.). This observation is perturbing since the most productive and economically viable age group of the population is the most affected. There is an urgent need for intensification of prevention programs to control such high-risk behaviors.

The seroprevalence of HIV infection was 1.5% with the highest burden among those between 18 and 48 years. This may have negative implications for the labor force, productivity, and economy of the state. This rate is lower than those reported by other studies on blood donors in Nigeria that recorded rates ranging from 0.08% in Ile-Ife to 10.6% in Aba.[24,25] The prevalence rate tends to correspond with the state prevalence

as reported in the National HIV/AIDS Reproductive Health Survey.[26] The survey reported prevalence rates ranging from 0.9% in Ekiti to as much as 15.2% in Rivers. Cross River State was reported to have 4.4%. The multiple kit algorithm screening method adopted by the center may account for the relatively low rate observed as it helps to minimize false-positive result.[25]

We found a seroprevalence rate 2.5% for syphilis among the apparently healthy intending blood donors. This is lower than 3.6% reported in Maiduguri[13] and 12.4% in Ilorin[27] but higher than 0.1% reported by Ejele *et al.*[23] in Port Harcourt, and Nwogoh *et al*. reported 1.19% in Benin,[28] southern Nigeria. There is geographical variation in prevalence of these infections. The risk of transmission of syphilis in donor blood higher in transfusion of freshly donated blood but declines after 48 h of refrigeration under optimal temperature for red cell storage (2 - 80C).[27]

The study has some limitations. All the possible reasons for donor deferral may not have being captured. This is due to information bias due to inadequate recording.

Conclusion

Seropositivity for TTIs and suboptimal hematocrit are the major reasons for deferral of potential donors in UCTH, Calabar. There is a high proportion of remunerated and replacement donors in our donor pool which may account for the present seroprevalence rate recorded.

There is a need to educate and encourage the donor population, especially family replacement and remunerated donors to adopt voluntary donation practice to improve blood safety. The hospital should adopt other measures such as rationalizing blood use, production and use of blood component, and developing a guideline for transfusion practices in the hospital. The hospital should revise the current practice of a uniform hematocrit limit for blood donors to encourage female donors.

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Conflicts of interest

There are no conflicts of interest.

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