RESEARCH ARTICLE

Non- infectious causes of deferral of blood donors at the volta regional hospital, Ghana: A Retrospective study

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BACKGROUND: The primary responsibility of a blood transfusion service is to provide a safe, sufficient and timely supply of blood and blood products. In fulfilling this responsibility, the blood transfusion services should ensure that the act of blood donation is safe and causes no harm to the donor. Also, necessary steps must be taken to ensure that the products derived from donated blood are efficacious for the recipient, with minimal risk of any infection that could be transmitted through transfusion.

GENERAL AIM: To determine the non-infectious causes of blood donor deferrals at the Volta Regional Hospital, Ho.

MATERIALS AND METHODS: The study quantified the non-infectious causes of donor deferrals at the Ho Teaching Hospital (formerly Volta Regional Hospital). In all, 1,566 clinical forms of blood donors between January, 2017 and December, 2017 were used. Data was fed into Microsoft Excel to generate a database. The cleaning and analysis of the data was done using statistical package for social sciences (SPSS version 22). Categorical variables were summarized as percentages and continuous variables were summarized as mean ±SD. Chi-square analysis was used to compare the prevalence of deferral among male and female blood donors.

RESULTS: Out of the 1,566 archived forms of people who had come to donate blood from January 2017 to December 2017, a total of 507 (32.4%) were deferred. 11.8% were deferred due to infectious reasons while 447 representing 88.2% were deferred based on the various non-infectious reasons. The highest prevalence of deferral due to non-infectious reasons was due to low haemoglobin level representing 40.7% of the total number.

CONCLUSION: From the study, non-infectious causes of deferral of blood donors is significant and most are temporary hence the deferred donors need to be educated and followed-up after the deferral period is over.

Key Words: *Deferral*; *Blood donors*; *Non-infectious*; *Haemoglobin*

INTRODUCTION

Blood transfusion is a crucial lifesaving therapy to many who have experienced road accidents, maternal haemorrhage, anaemia, different surgical procedures and a number of other medical and surgical conditions [1]. Blood donors can be defined as "persons who donate either whole blood or blood products for transfusion" and these individuals provide a global estimate of 112.5 million blood donations yearly [2].

In sub-Saharan Africa, the need for blood transfusion is great, owing to a high prevalence of obstetric haemorrhage, malnutrition, and a heavy burden of infectious diseases such as malaria [3]. About half of all donations come from developing countries which constitutes more than 80% of the world's population. The World Health Organization (WHO) further provides estimations of nearly nine times greater average blood donation rates in developed countries when compared to developing countries, equivalent to 4.6 donations per 1000 people in developing countries compared to 33.1 donations recorded in developed countries [4].

Deferral may be defined as temporary postponement or permanent exclusion from donating blood due to being suspected or confirmed of having an infectious disease, haematological disease, or any other medical condition that will either influence the safety of blood or affect donors' own health [5]. However, the prevalence of blood donor deferrals varies widely, and examples that follow substantiate these variations. In Asia, blood donor deferrals differ from one locality to another [6], and different studies report the prevalence that ranges from 4.6 to 30% [7]. Observations in different countries within Europe show that the prevalence of blood donor deferrals is slightly lower than that from Asia [8]. In Africa, the prevalence of blood donor deferrals seems to be comparable to that of middle-income countries. For example, the prevalence is 10.8% in Ivory Coast [2], and 7% in Zimbabwe [9]. These studies confirm that blood donor deferral is an issue in all countries including Ghana where the prevalence particularly in the Volta region is not known due to unavailability of published data. Regardless of the prevalence of deferral, it may be generally noted that it is an issue of concern to most blood transfusion centers in the world as it affects both low income and high-income countries and leads to inadequate supply of blood for transfusion due to lack of eligible blood donors [6].

Blood donor deferral is a sad experience to the donor and the blood bank as whole [10]. Blood donor deferral leads to loss of available blood units for transfusion. Several lives are regrettably lost due to the perennial shortage of blood at blood banks. Prospective blood donors who have ever been deferred feel reluctant to come forward to donate blood due to the negative impact of being rejected previously [11].

MATERIAL AND METHODS

Study design: A retrospective cross-sectional study was conducted using archived donor's clinical form/data from the hospital's blood bank from the period of January 2017 to December 2017 to estimate the prevalence of non-infectious causes of blood donor deferrals at the Volta Regional Hospital. Data was also collected on individual characteristics which were derived from the clinical forms assessed.

Study site: The study was conducted at the blood blank of the Ho Teaching Hospital (formerly Volta Regional Hospital) The Ho Teaching Hospital is a three hundred and two (302) bed capacity facility established in December 2000. It is situated in the Ho Municipality of the Volta Region. The Ho municipality has an estimated population of ninety-six thousand. The Ho Teaching hospital draws its clientele from within the Volta region, Oti region, part of the Eastern Region and the Republic of Togo. The University of Health and Allied Sciences and the Ho Nurses Training College are affiliated to the Ho Teaching Hospital. The hospital receives referred cases from the entire Volta and Oti regions. It is a well-structured facility that runs 24-hour health care services. The Ho Teaching hospital has several

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departments such as internal medicine, surgical, maternity, pediatric, an emergency center, intensive care unit, urology, dialysis unit, radiology unit with a functional and an ultra-modern Magnetic Resonance Imaging (MRI) center, a world class laboratory, vision center, dental unit, ear nose and throat unit, neonatal intensive care unit, premature babies' unit, herbal medicine department, psychiatry unit, diabetic, chest and HIV clinics.

Study population: Archived data of blood donors, who presented at the hospital's blood bank from the period of January, 2017 to December, 2017 were used. Data from donors between the ages of 15-60 years, who failed a history screen of their medical and physical state and pre-donation screening test for haemoglobin level, blood pressure, pulse and weight, were considered in the study.

Eligibility criteria: All blood donors that had been deferred based on the non-infectious causes with documented records from January 2017 to December 2017 (screening form) in the Ho Teaching Hospital blood bank were used in the study. All blood donors deferred based on the infectious causes in the Ho Teaching Hospital blood bank. All blood donors deferred based on the non-infectious causes in the Ho Teaching Hospital blood bank but their screening forms cannot be traced were not included.

Sample size: A total of 1566 archived clinical forms of blood donors who came for donation from January 2017 to December 2017 were used for the study.

Data collection and analysis: This retrospective study was conducted at the Volta Regional Hospital Blood Bank through the data collected by the blood bank on the clinical forms used for the screening of the blood donors from January 2017 to December 2017. Data was collected and entered into the data collection form designed and later transferred into the SPSS version 22 for analysis. Content analysis was undertaken to identify categories. Continuous variables (age, weight) were summarized as mean ± standard deviations while the categorical variables were summarized as percentages. Chi-square was used to compare the prevalence of various non-infectious causes of deferral among male and female blood donors.

Outcome measures: The following parameters were the non-infectious causes of deferrals identified: haemoglobin age, vital signs, weight, blood pressure, pregnancy, lactation, menstruation, medication and physical appearance of donor.

Ethical considerations: The confidentiality of donors whose records were assessed was judiciously guarded per research best practices. Codes were assigned to denote the identities of donors to the Ho Teaching Hospital Ethical clearance was obtained from the University of Health and Allied Sciences Research and Ethics committee with protocol identification number as UHAS_REC A 4(179) 18-19.

RESULTS

Background: In this study, a total of 1,566 archived data/forms of people who came to the hospital to donate blood from January, 2017 to December, 2017 were studied. In all, 60 people were deferred due to infectious reasons while 447 people were deferred for various non-infectious reasons. A total of 11 forms were not completed hence were excluded. The mean age of people who were deferred for non-infectious reasons was 21.1 ± 7.1 years with the minimum age being 15 years while the maximum age was 66 years. Moreover, out of those who were deferred for non-infectious reasons, 120 (26.8%) were males and 327 (73.2%) were females. These findings are shown in Table 1 below.

TABLE 1
Table showing the background of searched documents.

Variable	N
Total documents searched, n	1,566
Deferral due to infections, n	60
Deferral due to non-infectious causes, n	447
Incomplete forms, n (%) *	11 (2.5%)
Age, years x ± SD (min, max) *	21.1 ± 7.1 (15,66)
Sex, n (%) *	
Male	120 (26.8%)
Female	327 (73.2%)
*Non-Infectious Deferral Cases Only	

Prevalence of Non-Infectious Causes of Deferral: The prevalence of deferral due to non-infectious causes from this study is presented in Figure 1. The highest cause of deferral was low haemoglobin level representing 40.7% of the total; this is followed by participants having a medical history other than infectious conditions and the Last Menstrual Period (LMP) both of which represented 28.2% each. The least prevalent reason for non-infectious deferral was low blood pressure representing only 0.9%. However, deferral due to high blood pressure represented 2% of the total number of forms searched. Low weight represented 6.9% of the total while pale appearance and other causes represented 4.9% each of the total non-infectious causes of deferral.

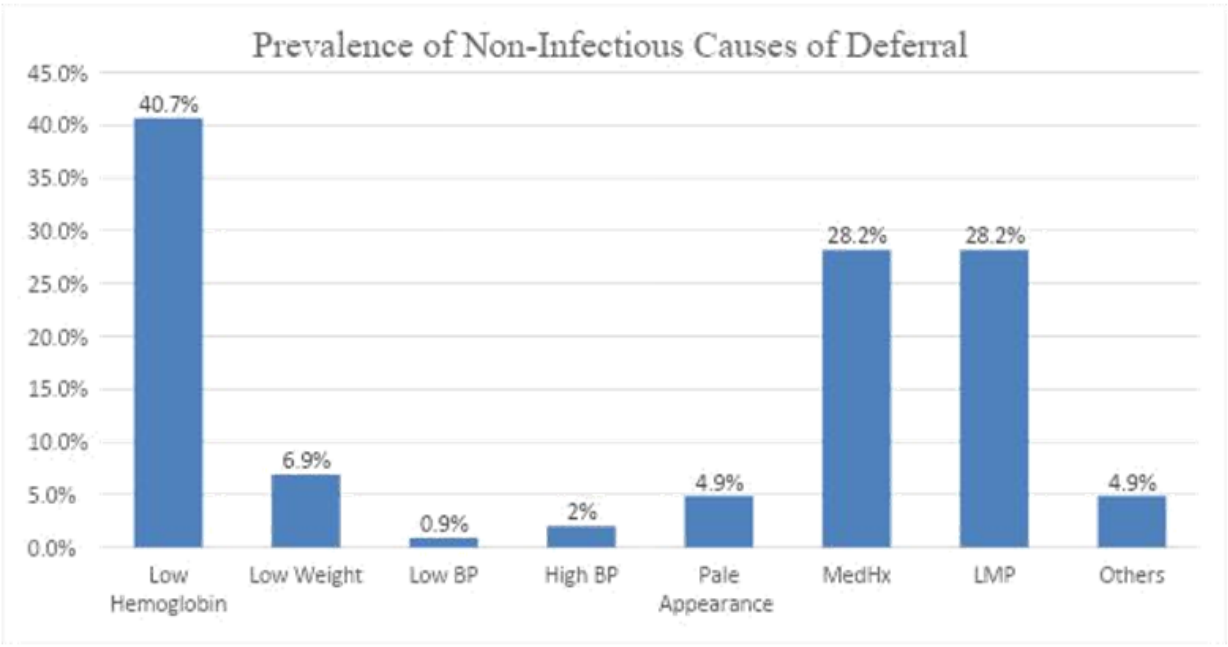

Figure 1) *Non-Infectious Causes of Deferral of Blood Donors at the Volta Regional Hospital.*

The results of chi-square analysis comparing the prevalence of the various non-infectious causes of donor deferral among female and male donors are shown in Table 2 below. In all, no statistically significant differences were observed for all the various causes.

Table 2
Comparisons of non-infectious causes of deferrals among male and female donors.

Variable	Male N= 120	Female N=327	P-value
Haemoglobin, n (%)			
Normal	67 (55.8%)	198 (60.6%)	0.2
Low	53 (44.2%)	129 (39.4%)	-
Weight, n (%)			
Normal	111 (92.5%)	305 (93.3%)	0.5
Underweight	9 (7.5%)	22 (6.7%)	-
Blood pressure, n (%)			
Normal	112 (93.3%)	322 (98.5%)	0.4
High	8 (6.7%)	1 (0.3%)	-
Low	0 (0%)	4 (1.2%)	-
Pulse, n (%)			
Normal	120 (100%)	324 (99.1%)	0.2
Low	0 (0%)	3 (0.9%)	-
Medication, n (%)			
Yes	30 (25%)	96 (29.4%)	0.2
No	90 (75%)	231 (70.6%)	-
Appearance, n (%)			
Normal	118 (98.3%)	307 (93.9%)	0.04
Pale	2 (1.7%)	20 (6.1%)	-

DISCUSSION

The study looked at the non-infectious causes of deferrals among blood donors at the Volta Regional Hospital in Ho. In this study 1566 donors' record from January 2017 to December 2017 were accessed at the blood bank at the Ho Teaching Hospital.

Gender: Out of the total deferrals of 507, 60 (11.8%) were deferred due to infectious causes whereas 447 (88.2%) were deferred based on the various non-infectious reasons. Out of the 447 total non-infectious deferrals among blood donors during the period under review, 120 (26.8%) were males and 327 (73.2%) were females. This is similar in trend to the 26.1% male non-infectious deferrals recorded out of the total non-infectious deferral of 4302 donors by Gonzo et al. in a retrospective study in Namibia. In the said study, 74.0% of women were deferred based on non-infectious reasons [12]. The disparities in deferral rate based on the gender between countries could be a manifestation of the total gender population presented for blood donation as some countries have more males than females who presented for donation or vice versa. Another reason that could contribute to the high deferral rates in females could be periodic blood loss due to menstruation which has a direct effect on iron bioavailability. In sharp contrast, 85.6% male non-infectious deferrals were registered out of 500 non-infectious donor deferrals recorded in Jeddah, Saudi Arabia, from October 2016 to May 2017 in a retrospective study. In the same study 14.4%, representing 72 women were deferred due to non-infectious causes [13].

Low haemoglobin: In this study, low haemoglobin level representing 40.7% accounted for the highest cause of non-infectious deferrals among donors during the period under review. This finding is in line with findings in a retrospective study conducted among 24,363 blood donors in the Ivory Coast, where the most frequent reason for donor deferral was low haemoglobin level. This accounted for 42.5% of the total deferral. Females constituted the majority of those deferred based on low haemoglobin level [3]. Also, in another study conducted in the Namibian University of Science and Technology (NUST) at the Namibian blood transfusion services (NAMBTS), 4,302 donors out of the total 50,074 were deferred. Low haemoglobin levels accounted for 45% (1,936) of those deferred [12]. According to Sathe and colleagues in a retrospective study conducted in India among 11, 620 donors, 44.2% male donors were deferred due to low

haemoglobin level while 55.3% female were deferred due to low haemoglobin level [14]. Similarly, Ekwere and colleagues also in a retrospective study conducted at the University of Uyo Teaching Hospital blood bank, Nigeria among a total 5,636 prospective blood donors from January 2009 to December 2012 reported that low haemoglobin level accounted for 39% of the 902 total deferrals [15]. Findings from the above-mentioned studies point to the fact that low haemoglobin among both male and female form a greater part of the non-infectious reasons for deferring blood donors. Taking a closer look at the results recorded at the Ho Teaching hospital, more men were deferred due to low haemoglobin levels. 44.2% of the 120 donors who were men were deferred based on the low levels of haemoglobin. The trend did not look different among women who were deferred based on low haemoglobin levels. 39.4% of the 327 women deferred due to non-infectious causes were attributed directly to low levels of haemoglobin. The slight differences in the number of men deferred on the basis of low haemoglobin from that of female is probably due to the fact that more men are involved in blood donation more than women.

Medical history: In this study, donors who were deferred based on their medical history other than infectious conditions and those rejected based on issues with their last menstrual cycle were 28.2%. The least prevalent reason for non-infectious deferral according to the study was as a result of low blood pressure, representing 0.9%, however, deferral due to high blood pressure represented 2% of the total number of 447 non-infectious deferrals. No male donor was deferred due to low blood pressure from the study carried out at the Ho Teaching Hospital during the period under review. On the contrary 4 out of the 327 women deferred were due to low blood pressure. This represented 1.2%. In contrast to the above observed, 6.7% of men were deferred due to high blood pressure, while only 1 female was deferred among the total 327 for high blood pressure. Blood pressure fluctuations had an insignificant bearing on non-infectious deferrals in previous studies such as retrospective studies conducted in the Ivory Coast and Namibia respectively [3,12]. The insignificant number of those who were deferred due to high blood pressure could be as a result of awareness among known hypertensive donors that they are more likely to be deferred during blood donation exercises, hence their decision not to avail themselves to donate blood altogether.

Weight: 22 women were deferred due to being underweight, while 9 men, representing 7.5% out of the non-infectious male deferral of 120 were deferred for the same reason of being underweight at the Ho Teaching Hospital during the period under review. These findings seem to agree with a study conducted among 500 donors who were deferred based on non-infectious causes in Saudi Arabia between the period of October 2016 to May 2017, where it was noticed that low weight accounted for 2.8% of such deferrals [13].

Medication: A total of 30 out of the 120 men deferred were due to reasons linked to medication. This accounted for 25% of the total deferral among men. 96 out of the 327 women deferred were as a result of issues relating to medication. This represented 29.4% of deferrals among women. According to Bashawri, in his study among 6,508 deferred donors in a retrospective study in Saudi Arabia, ingestion of medication accounted for 1745, representing 26.8% of the total non-infectious deferrals [16]. This outcome is consistent with our findings at the Ho Teaching Hospital among 447 deferrals due to non-infectious reasons. The figures recorded in this study however was higher than the 13.6% recorded by Gonzo et al. (2016), in their retrospective study in Namibia and the 4.2% out of the total deferrals of 2618 donors recorded in the Ivory Coast by Kouao et al (2012) respectively. The issue of donors being deferred based on history of medication or being actively on medication at the time of being evaluated for donation could be attributed to the demographic characteristic of donors vis-à-vis disease distributions peculiar to the areas under review. Another likely contributing factor to the significant frequency of donors who were deferred due to reasons linked to medication could be the issue of prevalence of self-medication among the population under review.

Physical appearance: Out of the 447 non-infectious deferrals at the Ho Teaching Hospital during the period under review, 6.1% of female donors were turned down due to their pale appearance. Two (2) men suffered similar fate. Findings from this study in the domain of deferral due to general appearance seem to be in line with findings from a study conducted in Saudi Arabia by Bashawri in 2005. In the said retrospective study conducted at the King Fahd Hospital of the University of Al-Khobar, Saudi Arabia between January 1996 to December 2003 among 33,900 donors, it was observed that 85 (1.3%) of the total 6,508 deferrals was as a result of issues bothering on the general appearance of those who turned up to donate [16]. Although details of the reasons for deferrals due to general appearance were not elaborated on, issues such as paleness, cachexia, and jaundice cannot be ruled out.

Pulse levels: Also, evident though insignificant were those deferred due to low pulse levels recorded. 4 of the female donors were deferred due to low levels of pulse recorded. None of the male donors were deferred due to low pulse level. This finding is similar to a retrospective study by Bashawri among 6,508 deferred donors in Saudi Arabia which recorded 1.0% of the deferrals to be due to low pulse rate [16]. In another study conducted in Jeddah Saudi Arabia from October 2016 to May 2017, out of a total non-infectious deferral of 500 donors, 22 were as a result of high pulse rate while 7, representing 1.4% were as a result of low pulse rate [13]. Nervousness, fear of donation and anxiety among first time donors could contribute to fluctuations in pulse rates.

CONCLUSION

From the study, non-infectious causes of deferral among donors are quite significant and have a role to play in the general shortfall in blood availability at any blood bank at any point in time. Low level of haemoglobin among donors is a pressing issue which must be given utmost attention and education to minimize non-infectious deferrals [17,18]. The non-infectious deferral rate was found to be 88.2% as opposed to 11.8% infectious deferrals, and the most common cause of non-infectious deferral reason is low hemoglobin (40.7%). There are variations in deferral rates from country to country and this could be due to different donor selection criteria utilized by each national guideline policy in each country or a local hospital setting. Understanding the profile of blood donors could help to identify portions of the population which could be roped in to increase the pool of voluntary blood donors and also to guide and provide the required database for the policy framework and program implementation [19,20].

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