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## RESEARCH ARTICLE

# Donor awareness: key to successful voluntary blood donation

## [version 1; referees: 2 approved with reservations]

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### Abstract

**Context:** The current regulatory requirements for donor eligibility pose a challenge to blood centers in recruitment of voluntary blood donors, particularly in a developing country like India where awareness of the general population is low and myths about blood donation are prevalent. This study evaluates the reasons and rates of donor deferral in a tertiary hospital-based blood bank in western India.

**Aim:** To find rates and reasons for deferral of voluntary blood donors in a city in western India.

**Settings and design:** A retrospective study was done on blood donors during a 3-month period. Data collection was done by electronic records of blood donors.

**Materials and Methods:** The study was conducted retrospectively at a tertiary care hospital in western India. All those who donated whole blood between 1st January 2011 and 31st March 2011 were included in the study. Data was collected using local blood bank software.

**Statistical analysis used:** No statistical technique used as it is a data article.

**Results:** 60.5% of donors were young, below 30 years of age. Donors were predominantly male (91.6%). Voluntary donors comprised 88% of the donors. Total deferral rate was 22.36%, with 17.29% permanent deferrals and 82.71% temporary deferrals. Main reasons for deferral were anemia 39.42%, low body weight 14.29%, hypertension 10.73%, age below 18 years 10.73% and history of medication 6.09%. The common causes of deferral between our study and other similar studies are the same.

**Conclusion:** We concluded that majority of the donor population belongs to 18–30-year-old age group. This is encouraging with a voluntary blood donation initiative. Donor self exclusion and strict donor selection criteria application should be addressed by more proactive measures to make blood donation a safe and pleasurable experience.

### Open Peer Review

Referee Status:

Invited Referees		
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- 1 **Cees Smit Sibinga**, University of Groningen Netherlands
- 2 **Deborah Sesok-Pizzini**, Children's Hospital of Philadelphia USA

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**Editorial note:**

Please note that the refereeing status of this article was changed from "indexed" to "[v1; ref status: approved with reservations 2]".

When this article was first published, *F1000Research* was still in its beta phase; during this period articles that received any two of "Approved" or "Approved with Reservations" statuses from the reviewers were labelled as "indexed". When the journal was formally launched in January 2013, the requirements for indexing were tightened, and only articles that are given either two "Approved" or one "Approved" plus two "Approved with Reservations" statuses by the reviewers are labelled "indexed". The new criteria for "indexing" can still be met in the future if a new revised version receives the necessary approval status from the reviewers.

**Introduction**

Blood donor selection criteria according to the guidelines of the National AIDS Control Organization are based on science, informed medical opinion and regulatory rules, its statistics show that annual rate of blood donation in India is about 7.4 million units, against requirement of 10 million units<sup>1</sup>. According to the Drugs and Cosmetics Act, not every person who walks into a camp/blood bank for blood donation is a donor. Donor by definition is a person who, after complete medical examination by the doctor, is declared fit for donation of blood. To make blood donation safe and increase the confidence of the masses in voluntary blood donation, many safety measures are implemented by the blood transfusion community. The most important of all safety measures is donor selection. Stringent, meticulous and serious donor screening is necessary to afford protection to blood donors and recipients<sup>2</sup>. The rates and reasons for donor deferral vary from region to region and from one center to another<sup>3</sup>.

**Subjects and methods**

We obtained full ethics approval for this study from the Ethics Committee of the Santokba Durlabji Memorial Hospital and Research Center, and the study was conducted in our blood bank from 1<sup>st</sup> January to 31<sup>st</sup> March 2011. We included all individuals coming for whole blood donation in blood bank and camps. There were a total of 8700 individuals during the three-month study period, comprising 7970 (91.6%) males and 730 (8.4%) females. (Table 1) 90% of the donors was voluntary. Most of the donors were residents

**Table 1. Distribution of Male and Female whole blood donors.**

The table indicates the total of 8700 individuals for blood donation. It represents the percentage of male and female donor's selection, and indicates which percentage were deferred donors.

Donor category	Male	Female	Total
Total donor selected	6620 (83.06%)	142 (19.45%)	6762 (77.72%)
Total donor deferred	1350 (16.94%)	588 (80.55%)	1938 (22.28%)
Total	7970	730	8700

of our city or within 100 km radius. The volume of whole blood collected was according to donor weight: 50–60 kg – 350 ml and > 60 kg – 450 ml.

Each donor was selected by the medical officer after taking detailed medical history and general physical examination, which included body weight, temperature, pulse rate and regularity and blood pressure. Deferred donors were classified as temporary deferral or permanent deferral. We followed deferral criteria laid down in the Drugs and Cosmetics Act 1940 (the rules there under) and Technical manual - Director General Health Services and Drug Controller of India. Standard operating procedures based on national guidelines were used for donor selection and deferral. The cut off for hemoglobin was 12.5 gm/dl by fingerpick method. All donors were screened for Hemoglobin values using CuSO<sub>4</sub> specific gravity method. Doubtful Hemoglobin values were confirmed by Hemocue 201+. In case of indoor donors, i.e. in blood bank, hemoglobin was estimated by Sysmex Kx21, fully automated complete blood count (CBC) counter.

**Results**

The majority of blood donors were voluntary donors (Table 2). A total of 60.5% of donors were young between 18–30 years (Table 3). Out of 8700 volunteers, 7970 (91.6%) were male. Among the 730 female donors only 112 (15.34%) donors were selected whereas among male donors 6650 (83.44%) were selected. As for male donors, deferral rate was 19.85%. Overall deferral rate was 22.36%. The most common cause of deferral was anemia 764 (39.42%) both in males and females. The other causes in decreasing order of frequency were low body weight 277 (14.29%), under age 151 (7.79%), history of drugs/medications 118 (6.01%), recent blood donation 75 (3.87%), icterus 49 (2.53%) and menstrual bleeding 45 (2.32%) (Table 4). Among the causes of permanent deferral, cardiac problems along with hypertension were the most common, accounting for 208 (10.73%) of all causes. Uncommon causes include asthma 27 (1.39%), diabetes mellitus on insulin therapy

**Table 2. Demographic profile of whole blood donors.** The table indicates the percentage of both male and female replacement and voluntary donors.

Donor category	Male	Female	Total
Replacement	906 (10.4%)	138 (1.6%)	1044 (12%)
Voluntary	7064 (81.2%)	592 (6.8%)	7656 (88%)
Total	7970 (91.6%)	730 (8.4%)	8700

**Table 3. Age profile of donors.** The table indicates the age distribution of the donors, and highlights that the majority of them are young.

Age in years	Number of donors	Percentage
18–30	5263	60.5
31–50	2524	29
51–60	913	10.5

**Table 4. Deferral reasons among whole blood donors.** The table highlights the permanent and the temporary deferral explanations amongst the donors.

Row labels	Sum of total	Percentage (%)
<b>Permanent</b>	<b>335</b>	<b>17.29</b>
Asthma	27	1.39
Dibetes on insulin	16	0.83
Epilepsy	11	0.57
Hepatitis	6	0.31
Hypertension	208	10.73
Icterus	49	2.53
Renal	2	0.10
Thyphoid	16	0.83
<b>Temporary</b>	<b>1603</b>	<b>82.71</b>
Anemia	764	39.42
Circulation	35	1.81
H/o drug/medication	118	6.09
Infection	40	2.06
Low weight	277	14.29
Malaria	31	1.60
Menstruation	45	2.32
Vaccine	30	1.55
Recent donation	75	3.87
Underage	151	7.79
*Other	37	1.91
<b>Grand Total</b>	<b>1938</b>	<b>100</b>

\* Include Influence of alcohol, recent surgery, recent ear piercing, fever, recent tattooing, dental extraction, breast feeding and history of transfusion of blood/blood components.

16 (0.83%), epilepsy 11 (0.57%), hepatitis 6 (0.31%), infection 40 (2.06%), malaria 31 (1.60%), tetanus or rabies vaccine 30 (1.55%) and other causes 37 (1.9%) including recent surgery, recent tattooing, dental procedure, fever, hypotension, low platelet count and renal disorder. There were 2 unsuccessful phlebotomies 0.001%. Farrales<sup>4</sup> reported a higher rate of failed phlebotomies (0.5%) in their study and Custer *et al.*<sup>5</sup> reported mis-collection (3.8%) in their study.

## Discussion

This study attempts to analyze the pattern of blood donation in a tertiary care hospital between Jan 1<sup>st</sup> 2011 to 31<sup>st</sup> March, 2011, in an emerging metropolitan city of western India.

Donor rejection or deferral leaves a person with negative feeling about themselves as well as the blood banking system. However, there are definite advantages of elimination of donors in order to

ensure the safety of blood donors as well as recipients of blood/blood products. Deferring donors also protects donors from possible adverse reactions and avoids consequent negative impact on donor motivation.

In our study the deferral rate was found to be 22.22% (1938). The lowest rejection rate was reported by Talonic<sup>6</sup> (4%) in Papua New Guinea while Chaudhry<sup>7</sup>, Lim<sup>2</sup>, and Ranveet<sup>8</sup>, Unnikrishnan<sup>9</sup>, Sunder<sup>10</sup> reported 8–15% deferral rates in their studies. The comparatively higher deferral rate in our study was due to the stringent donor selection criteria, strict adherence to guidelines of the National Aids Control Organization and National Accreditation Board for Hospitals & Healthcare Providers. Women had a very high deferral rate in comparison to men reflecting the poor nutritional status of female population in our country. Similar observations were reported in studies in Manipal<sup>9</sup>, Delhi<sup>11</sup> and Bangluru<sup>10</sup>. As reiterated in the national health policy of achieving 100% voluntary donation, our blood bank received 88% of its donors as voluntary donors in comparison to 12% replacement donors, which is way above the national average of 39.3%<sup>11</sup>. Voluntary donation adds to the quality and safety to blood donors and as there is no peer pressure on either the donor or the medical officer; evaluation of donors is purely on the basis of donor selection criteria. There were 335 (17.29%) permanent deferrals as against 1603 (82.71%) temporary deferrals. In a similar study, Custer *et al.*<sup>5</sup> reported 68.5% temporary and 31.5% permanent deferrals. The lower numbers of permanent deferrals in our study are due to the majority of young donors. A total of 5263 (60.5%) donors were below 30 years of age (Table 2). It is due to active blood donation motivational activities and programs carried out by blood banks in educational institutes through lectures, presentations, posters and pamphlets that large number of young individuals are recruited, thereby strengthening long-term voluntary blood donation belts. In Shaz's study<sup>12</sup>, donors aged more than 60 years were allowed to donate, but in India, individuals above 60 years of age are not permitted to donate blood, but we received 913 (10.5%) donors who were between 50–60 years of age.

The minimum hemoglobin for blood donation is 12.5 mg/dl. Despite all efforts by the government towards reducing nutritional anemia, it is still very common in our country. This is evident from the finding that the most common cause of deferral in our study was low hemoglobin in 764 (39.42%) donors. Low hemoglobin was the commonest cause of deferral in most of studies by Sunder *et al.*<sup>11</sup>, Charles *et al.*<sup>13</sup> and Agnihotri N<sup>14</sup>. The minimum cut-off hemoglobin level for blood donation is >12.5 gm% irrespective of sex. The second most common cause for deferral was body weight below 50 Kilograms 277 (15.48%), followed by under age 151 (7.79%). Body weight is related to poor health status of the general population and poor nutrition being common in low socio economic groups. Under-aged potential donors were unaware of basic requirements for blood donation, i.e. age, weight and hemoglobin percentage, indicating the importance of public awareness and education for successful voluntary blood donation. We mostly received voluntary donors, the majority of them in camps. Perhaps the

organizations involved in recruiting donors are more enthusiastic in gathering people and pay less emphasis on the eligibility criteria, which adds to the large number of under-aged (151 [7.79%]) and underweight (277 [15.48%]) donors, thus resulting in deferrals. It is of utmost importance for organizations hosting blood donation camps to understand that blood donation is a science and meticulous donor screening is essential. The eligibility criteria for blood donation should be followed stringently; unnecessary gathering of people causes wastage of resources. Self exclusion by donors themselves is the answer to these problems. Self deferral by donors is only possible when our population is educated about selection criteria for blood donation.

Hypertension was the most common cause for permanent deferral 208 (10.73%). Hypertension was noted as common cause of deferral in a similar study by Bahadur *et al.*<sup>11-13</sup>. It was surprising that hypertension, along with cardiac problems, was roughly equally distributed in various age groups. In younger age groups, this might be due to apprehension and anxiety for donation, induced by fear of phlebotomy or fear of the sight of blood. Hypertension is a growing, undiagnosed, epidemic in our country, where people seek medical advice on appearance of signs and symptoms, and seldom go for annual checkups. Additionally, use of electronic blood pressure equipment, with more objective readings could have picked up more hypertensive donors. The use of drugs, particularly antibiotics, antihypertensive and analgesics, was a significant reason accounting for 118 (6.81%) of deferrals (Table 3).

Indian studies from Chandigarh<sup>8</sup> and Lucknow<sup>7</sup> report jaundice as the most common cause of deferral. In a study by Halperin *et al.*<sup>15</sup> the three most common causes of temporary deferral were low hemoglobin, cold/sore throat and fever, whereas in a study by Ranveet *et al.*<sup>8</sup>, underweight, underage and low hemoglobin level were the most common causes. Hence, donor deferral studies indicate that in each region there are unique sets of reasons for deferral.

The objective during donor selection should be blood collection as well as donor safety. Safety of donors is important as it helps in gaining confidence and winning the trust of future donors as well.

Donor selection should be done with care, caution, sincerity and ethically, failing which we would be compromising donor safety and defeating the ultimate goal of 100% voluntary blood donation. In our country, where there are myths and social stigma attached with blood donation, we need to be very cautious in donor

selection, as any harm to a donor would send the wrong message to the masses. Dorothy *et al.*<sup>16</sup> supported the view that medical examination may actually serve as an incentive for future repeated donations.

Anemia is the major cause of deferral. Referring such cases to physician for evaluation and treatment of anemia and asking them to donate at a later date is pivotal in ensuring donor recruitment and retention.

## Conclusion

The study showed that most of the donors were between 18- to 30-years old. This is encouraging, as they could be motivated to become regular voluntary donors. Temporary deferral has a negative impact on blood donor return rate and subsequent donations<sup>7</sup>. It is necessary to follow strict donor selection criteria to make blood donation safe and win the trust of future donors. To strike a balance between donor selection and deferral, self exclusion by the donor is the key. This can be achieved by advertising campaigns, brochures, lectures, presentations, donor awareness programs and interaction with donors. The entire blood bank staff, especially medical officers, should share the responsibility of winning the confidence of donors and making blood donation a safe and pleasurable experience which will eventually increase voluntary blood donation, giving a permanent remedy to the shortage of blood in the country.

## Author contributions

RS wrote the article and contributed to the conception and design, collection of data and data analysis. GNG aided in the design and final approval of the manuscript. AD contributed to the data analysis and interpretation, conception of the article and manuscript writing.

## Competing interests

No competing interests were disclosed.

## Grant information

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# Open Peer Review

Current Referee Status:



Version 1

Referee Report 24 October 2012

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**Deborah Sesok-Pizzini**

Blood Bank and Transfusion Medicine Department, Children's Hospital of Philadelphia, Philadelphia, PA, USA

This article focuses on the challenges of blood donation in a tertiary care hospital in western India and presents a retrospective study of blood donor deferrals from a 3-month period from Jan 2011-March 2011.

The study concluded that the deferral rate was 22.36% with a 17.29% permanent deferral rate for donors. Hypertension was the most common cause for a permanent deferral, and anemia was the most common cause for temporary deferral. Of interest, the paper concluded that the majority of donors were between 18-30 years of age.

The limitations of this study are that it does not address issues of donor awareness and details about the recruitment process for these donors. Information is unavailable if these donors would in fact be return donors. Additional data, such as a survey given to donors, would be needed to understand the motivation of a regular voluntary donor and the impact of a temporary deferral. While this paper does give interesting information about deferral statistics, and meets the stated aim of the study, the results and conclusions do not really address donor awareness, and therefore conclusions are limited to assess the real impact on donor return rates in a voluntary donor program in India.

**I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.**

**Competing Interests:** No competing interests were disclosed.

Referee Report 17 October 2012

doi:10.5256/f1000research.202.r405



**Cees Smit Sibinga**

Faculty of Medical Sciences, University of Groningen, Groningen, Netherlands

Upon review, the title of the article and the actual research in the paper show a considerable discrepancy. The study itself seems to focus more on the reasons for deferral and not so much on awareness as stated in the title. Furthermore, there is no indication of the contents of an assumed awareness.



Overall, the outcome provides some local demographic and some medical (deferral) information, which as such is nothing new or exciting. However, the awaking interest in a safe and sustainable blood supply in India deserves some peer appreciation.

**I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.**

***Competing Interests:*** No competing interests were disclosed.

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