

Study of Blood Donor Deferral in a Tertiary Care Hospital, Northern India

HARISH BHARDWAJ¹, DAVENDRA SWARUP², RANI BANSAL³

ABSTRACT

Introduction: Blood donation programme is vital to any transfusion service. Deferral is a painful and sad experience both for the donor and the centre. Thus, every blood centre has to pivot between admissible quality and desired quantity.

Aim: To find out incidence and pattern of donor deferral in a tertiary care hospital, Meerut, Uttar Pradesh, India.

Materials and Methods: A retrospective cross-sectional study was conducted over a period of four years from January 2016 to December 2019 in a blood bank, Department of Pathology in a tertiary care hospital of Meerut, Uttar Pradesh, India. Details of donors who were deferred either temporarily or permanently during the study period were collected from the deferral files. Data analysis was done by calculating the percentage for every cause of donor deferral.

Results: Out of the 29,663 donors who registered for blood donation during the study period, 2,626 donors were deferred due to several reasons. Temporary reasons (2592) were like anaemia, medications, alcohol, allergy, low-weight, fever, tattooing and permanent causes (34) were like hypertension, cardiac disorders, diabetes, asthma and thyroid disorders. Anaemia was the most common cause for deferral and total deferral rate came out to be 8.85%.

Conclusion: Studying and analysing the profile of blood donors helps to identify categories of population which could be targeted to increase pool of voluntary blood donors. Education, motivation and treatment of these deferred donors due to anaemia or other temporary causes is an important aspect in blood banking, so that these donors may be recruited again.

Keywords: Anaemia, Blood donation, Donor recruitment, Donor refusal

INTRODUCTION

Proper donor selection for blood donation is an important step to ensure safety for both donor and recipient [1]. Blood safety is ensured through the selection of relevant donor population, screening of donors, examining of donated blood units, and coherent blood transfusion practices as per the Drugs and Cosmetic Act 1940 [2]. "Deferred" donors are the individuals debarred from blood donation [3]. Donor deferral is a form of rejection and also plays a major role in blood shortage in blood banks. It causes loss of time and manpower to a large extent [4]. National AIDS Control Organisation and the State Blood Transfusion Councils do not diligently collect data on donor deferrals. Their formats for data collection are predisposed toward "quantity" of supply and deferrals solely due to infectious marker positivity in donated units. As a result, most of the efforts at government, community, individual level are focused at engaging new donors while passing over the re-entry of those recruited but deferred due to various reasons. This can be achieved by investigating the reason of these deferrals, addressing the issue, ameliorating the cause if possible [5].

The present study was done to analyse various causes for blood donation deferral among blood donors and to calculate the donor deferral rate at our hospital-based blood bank.

MATERIALS AND METHODS

A retrospective cross-sectional study of 2626 blood donors who were deferred from blood donation from a tertiary care hospital, Meerut, Uttar Pradesh (UP), India with licensed blood bank of a postgraduate medical institute which facilitates the collection, preparation, storage and distribution of blood and its components for a period of four years from January 2016 to December 2019. The study was conducted from August 2020 to March 2021 and was approved from the University Ethics Committee, Medical

(SMC/UECM/2021/332/173). Every blood donor who attended blood bank was screened based on donor questionnaire (annexure) made according to criteria laid down by Director General of Health Services [6] and Drug Controller of India [7]. Informed consent was taken from participating blood donor.

Procedure

Data of deferred donors were obtained from donor deferral files. The donors who were deferred were differentiated according to their gender and age group. Deferral reasons were analysed amongst different categories. Every blood donor was evaluated by taking history, physical examination, haemoglobin estimation, weight, age, blood pressure, pulse rate and temperature.

Standard Operating Procedure (SOP) which were based on the national guidelines were used for the donor selection and deferral. The cutoff for haemoglobin was 13.5 gm/dL for males and 12.5 gm/dL for females by the finger prick method. Donors with a systolic blood pressure between 100 mm and 140 mm of Hg, diastolic blood pressure between 60 mm and 90 mm of Hg measured by a fully automatic blood pressure monitor (Accupam, Morepen Laboratories) and there were no findings suggestive of end organ damage or secondary complications (cardiac, renal, eye or vascular) or history of feeling giddiness, fainting as ascertained during history and examination, neither the drug nor its dosage had been altered in the last 28 days were accepted for the blood donation. The blood was collected in two quantities 350 mL and 450 mL depending on the weight of donors. From donors weighing between 45-60 kg, 350 mL was collected and from those who weighed above 60 kg, 450 mL was collected.

STATISTICAL ANALYSIS

Data analysis was done by calculating the percentage for every cause of donor deferral.

RESULTS

Among 29,663 predonation registrations, 27,037 (91.14%) were selected for blood donation whereas 2,626 (8.85 %) were deferred on various grounds [Table/Fig-1]. The deferral rate of females and replacement donors were approximately 4.99 and 2.93 times higher than males and voluntary donors [Table/Fig-2]. It was observed that temporary donor deferral (2592) was more common in younger age groups with causes like anaemia, medications, alcohol, allergy, low-weight, fever, tattooing whereas permanent donor deferral (34) was found more in older age groups with causes like hypertension, cardiac disorders, diabetes, asthma and thyroid disorders [Table/Fig-3].

| Age groups (in years) | Males | Females | Total | Percentage (%) |
|-----------------------|-------|---------|-------|----------------|
| 18-30 | 1195 | 293 | 1488 | 56.66 |
| 31-40 | 635 | 138 | 773 | 29.44 |
| 41-50 | 251 | 43 | 294 | 11.20 |
| 51-60 | 56 | 08 | 64 | 2.44 |
| 61-65 | 05 | 02 | 07 | 0.26 |
| Total | 2142 | 484 | 2626 | 100 |

[Table/Fig-1]: Age wise distribution of deferred blood donor.

| Category | | Pre-donation registrations | Deferred number (n) | Deferral rate (%) |
|--------------|-------------|----------------------------|---------------------|-------------------|
| Gender | Males | 28379 | 2142 | 7.55 |
| | Females | 1284 | 484 | 37.69 |
| Donor groups | Voluntary | 8459 | 314 | 3.71 |
| | Replacement | 21204 | 2312 | 10.90 |
| | Autologous | - | - | - |

[Table/Fig-2]: Collation of the deferral rate based on gender and donor groups.

| Donor deferral type | No. of cases | Percentage (%) |
|---------------------|--------------|----------------|
| Temporary | 2592 | 98.71 |
| Permanent | 34 | 1.29 |
| Total | 2626 | 100 |

[Table/Fig-3]: Donor deferral type.

Anaemia came out to be the most common cause for donor deferral followed by alcohol and medications. Fever cases were 172 (6.55%) which included pyrexia of unknown origin, dengue, malaria, typhoid and chikungunya. Respiratory cases were 30 (1.14%) which included upper respiratory tract infection, cough, tuberculosis, lung disease, asthma, pneumonia. Hepatic causes were 44 (1.68%) which included jaundice, hepatitis B, hepatitis C, liver abscess. Chronic diseases were 63 (2.39%) which included diabetes mellitus, thyroid, heart disease, epilepsy, kidney diseases and hypertension [Table/Fig-4].

| Medical causes | No. of cases | % (of 2626 cases) |
|-----------------------------|--------------|-------------------|
| Anaemia | 1012 | 38.54 |
| Alcohol | 346 | 13.18 |
| Medications | 282 | 10.74 |
| Allergy | 196 | 7.46 |
| Fever | 172 | 6.55 |
| Chronic diseases | 63 | 2.39 |
| Hepatic causes | 44 | 1.68 |
| Respiratory causes | 30 | 1.14 |
| Diarrhoea | 08 | 0.30 |
| H/o Cervical pain treatment | 01 | 0.04 |
| Swelling on hip | 01 | 0.04 |
| Menorrhagia | 01 | 0.04 |
| Total medical causes | 2156 | 82.10 |

[Table/Fig-4]: Medical causes.

These results revealed a vast variety of causes that can uplift our knowledge concerning donor deferral [Table/Fig-5-8]. There were two responses provided i.e., yes or no and these were responses to the questionnaire by the study population [Table/Fig-9].

| Surgical causes | No. of cases | % (of 2626 cases) |
|------------------------|--------------|-------------------|
| Tooth treatment | 71 | 2.70 |
| Tattooing | 51 | 1.94 |
| History of surgery | 26 | 0.99 |
| Ear piercing | 16 | 0.61 |
| Injury on body parts | 13 | 0.5 |
| History of dog bite | 05 | 0.19 |
| History of RTA | 03 | 0.11 |
| History of abortion | 02 | 0.08 |
| Piles (bleeding) | 01 | 0.04 |
| Tooth bleeding | 01 | 0.04 |
| Burn by electric shock | 01 | 0.04 |
| Total surgical causes | 190 | 7.24 |

[Table/Fig-5]: Surgical causes.

RTA: Road traffic accident

| Physiological causes | No. of cases | % (of 2626 cases) |
|---------------------------------------|--------------|-------------------|
| Underweight | 51 | 1.94 |
| H/o Blood donation | 50 | 1.90 |
| Menses | 05 | 0.19 |
| Breast feeding | 04 | 0.15 |
| History of delivery (within 4 months) | 02 | 0.07 |
| Pregnancy | 02 | 0.07 |
| Total physiological causes | 114 | 4.34 |

[Table/Fig-6]: Physiological causes.

| High risk history | No. of cases | % (of 2626 cases) |
|-------------------------|--------------|-------------------|
| Sexual behaviour | 14 | 0.53 |
| Injection mark on arm | 02 | 0.08 |
| Drug addict | 01 | 0.04 |
| Professional donor | 01 | 0.04 |
| Total high risk history | 18 | 0.69 |

[Table/Fig-7]: High risk history.

| Miscellaneous causes | No. of cases | % (of 2626 cases) |
|--|--------------|-------------------|
| Vaccination | 66 | 2.51 |
| High haemoglobin | 29 | 1.10 |
| Thin veins | 24 | 0.91 |
| Not willing/refusal at time of bleeding | 06 | 0.23 |
| Fasting | 05 | 0.19 |
| Needle phobia | 04 | 0.15 |
| Low platelet count (as per report available) | 04 | 0.15 |
| Low blood pressure | 03 | 0.11 |
| Physical appearance not well | 02 | 0.08 |
| Anxiety | 02 | 0.08 |
| Inadequate sleep | 01 | 0.04 |
| Vomiting | 01 | 0.04 |
| Sweating | 01 | 0.04 |
| Total miscellaneous causes | 148 | 5.63 |

[Table/Fig-8]: Miscellaneous causes.

DISCUSSION

The theme of world blood donor day for the year 2021 was "Give blood and keep the world beating." World blood donor day is celebrated every year on 14th of June as it is birth anniversary of Sir Karl Landsteiner. The celebration was first started in the year 2004

| Questions | Yes | No |
|---|--------------|-------|
| Would you like to be called on your mobile phone if required? | 90% | 10% |
| Did you donate blood earlier? If yes, how many times? | 40% | 60% |
| | Once-50.3% | 0 |
| | Twice -10.6% | |
| | Thrice- 5.2% | |
| More than thrice-33.9% | | |
| Did you have any difficulty during last blood donation? | 0 | 100% |
| Are you feeling well today? | 100% | 0 |
| Did you have something to eat in last 4 hours? | 99.81% | 0.19% |
| Did you sleep well last night? | 99.97% | 0.03% |
| Would you like to be informed, if any abnormality is detected on investigation? | 100% | 0 |

[Table/Fig-9]: Responses to donor questionnaire.

aiming to raise public awareness about the need for safe blood donation. National and international efforts are on to ensure safe blood supply through screening education. An adequate supply of blood is required but not at the cost of either donor or recipient safety. Paucity of healthy safe donors has always been a serious problem for blood banks all over the world. Patients requiring transfusion as part of their clinical management have the right to expect that their needs would be met and they receive the safest blood. However, many patients die or suffer needlessly because they do not have access to safe blood transfusion. The timely accessibility to judicious blood and blood products is indispensable in all healthcare centres performing transfusion, but in many developing and transitional countries, there is a widespread difference between blood demand and supply [8].

Donor selection process is a cardinal preliminary step in blood banking and should be followed with strict medical and regulatory norms corroborating both donor and recipient safety. Donor deferral can be insinuated as loss of manpower, time and other valuable resources for both the donors and medical personnel and can have a negative influence on blood donation among donors [4]. Since, causes of deferral have not received required deliberations, this study was conducted to examine donor deferral patterns to quantify the loss.

Taneja K et al., in their study reported 86.1% temporary deferral and permanent deferral accounted for 13.9% cases [9]. Temporary deferral of 90.9% and permanent deferrals was 9.1% of total deferrals were recorded by Bahadur S et al., [10]. Our study recorded a temporary deferral rate of 98.71% and permanent deferral rate of 1.29%. Present study results were similar to many other studies indicating higher rate of temporary deferral [Table/Fig-10] [3,9-13].

Donor deferral rate was 8.85% for present study which is similar to other studies except Taneja K et al., which shows deferral rate of 17.1% due to higher prevalence of anaemia in their population [9]. Studies in literature showed varied rates of donor deferral ranging from 5.19% to 35.6% across the world [8].

In all above studies, anaemia was most common cause of donor deferral. These findings underscore the huge burden of anaemia (particularly iron deficiency anaemia) in these population and may be attributable to poor nutrition along with menstrual blood loss in females [Table/Fig-11] [1,2,9,13-20].

A single unit of blood donation has been shown to result in depletion of up to 236 mg of iron from body stores [16]. Therefore, without temporary deferral of prospective donors with low haemoglobin concentration, the burden of anaemia could significantly worsen.

Low weight was also a reason of deferral which again reflects poor nutritional status of the population, as both anaemia and low weight are curable, a large number of temporary deferred donors can be recruited back into the donor pool by proper management. Deferral rate for low

| Study | Region | Year | Total no. pre-donation registrations | Blood donor deferred | Deferral rate |
|-----------------------------|------------------------|------|--------------------------------------|----------------------|---------------|
| Bahadur S et al., [10] | Delhi | 2009 | 16694 | 1503 | 9% |
| Sundar P et al., [3] | Bangalore, Karnataka | 2010 | 16706 | 976 | 5.84% |
| Unnikrishnan B et al., [11] | Mangalore, Karnataka | 2011 | 13722 | 713 | 5.2% |
| Sharma T et al., [12] | Delhi | 2013 | 19125 | 976 | 5.1% |
| Taneja K et al., [9] | Patiala, Punjab | 2015 | 24062 | 4125 | 17.1% |
| Sabari Priya E [13] | Puducherry, Tamil Nadu | 2019 | 15807 | 971 | 6% |
| Present study | Meerut, UP | 2021 | 29663 | 2626 | 8.85% |

[Table/Fig-10]: Deferral rate-comparative analysis [3,9-13].

| Study | Region | Year | Causes of deferral | | | |
|-------------------------|---------------------|------|--------------------|------------|---------------|--------------|
| | | | Anaemia | Low-weight | On medication | Hypertension |
| Rabeya Y et al., [1] | Malaysia | 2008 | 40.7% | - | - | 29.4% |
| Girish CJ et al., [14] | Karnataka, India | 2012 | 19.45% | 9.09% | 5.91% | 39.95% |
| Birjandi F et al., [15] | Iran | 2013 | 8.35% | 0.32% | 9.11% | 14.24% |
| Chauhan DN et al., [16] | Gujarat, India | 2015 | 15.45% | 10.66% | 10.45% | 1.96% |
| Chenna D et al., [17] | Karnataka, India | 2015 | 48.7% | 8.9% | 4.1% | 18.6% |
| Taneja K et al., [9] | Punjab, India | 2015 | 51% | 3.1% | 18% | 6.8% |
| Aneke CJ et al., [18] | Nigeria | 2016 | 25.30% | 0.04% | - | 1.91% |
| Bobati SS et al., [19] | Karnataka, India | 2016 | 25.3% | - | 6% | 14% |
| Jethani N et al., [2] | Rajasthan, India | 2016 | 37.4% | 11.76% | 3.38% | 8.84% |
| Gaajre AV et al., [20] | Maharashtra, India | 2016 | 44.9% | - | 13.6% | 17.7% |
| Sabari Priya E [13] | Tamil Nadu, India | 2019 | 37.08% | 2.99% | 2.16% | 9.47% |
| Present study | Western U.P., India | 2021 | 38.53% | 1.94% | 10.73% | 1.06% |

[Table/Fig-11]: Percentage of causes of deferral with comparison to other studies [1,2,9,13-20].

body weight in this study was 1.94% which is similar to Taneja K et al., and Sabari Priya E but much lower than Chauhan DN et al., [9,13,16].

Deferral rate for hypertension in our study is 1.06% which is similar to Chauhan DN et al., and Aneke CJ et al., [16,18] but Rabeya Y et al., reported 29.4% and Girish CJ et al., reported 39.95% and both of these results are much higher in comparison to our study, this may be due to rigorous adherence to the donor selection procedures in their centres [1,14]. However, with respect to lower return rate of deferred donors, deferral management should be considered.

The rates and reasons of donor deferral varies from region to region [21]. The diversified differences in deferral rate may be due to different donor selection criteria, prevalence of transmitted diseases, high sexual activities and religious and superstitious beliefs in blood donation [8].

Limitation(s)

This study failed to analyse donor deferral in terms of their occupation due to lack of data in deferred files. It should be ensured that donors provide occupational information to find out the relationship between occupation and blood donors deferred in the future for similar study topic. Also, deferral rate based on age groups could not be accessed.

CONCLUSION(S)

Among temporary causes for deferral, anaemia emerges as the most common reason in our study which can be corrected by nutritious food and supplements, so that these donors may be recruited again. The present study helps in identifying the rates and causes of deferral which will facilitate in future recruitment planning and administration. Elderly blood donors show high propensity for hypertension and diabetes mellitus, so they should be screened rigorously and follow-up must be ensured.

Hence, studying and keeping the record of blood donor deferrals will facilitate to identify category of the community which could be targeted to increase the pool of voluntary blood donors. This can provide the essential database for framing and modulating policies which will increase quality and quantity of blood pool.

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PARTICULARS OF CONTRIBUTORS:

1. Junior Resident, Department of Pathology, Subharti Medical College, Meerut, Uttar Pradesh, India.
2. Professor, Department of Pathology, Subharti Medical College, Meerut, Uttar Pradesh, India.
3. Head, Department of Pathology, Subharti Medical College, Meerut, Uttar Pradesh, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Harish Bhardwaj,
WZ-71, Chaukhandi Extension, Tilak Nagar, New Delhi-110018, India.
E-mail: bhardwajharish06@gmail.com

PLAGIARISM CHECKING METHODS: ^[Jain H et al.]

- Plagiarism X-checker: Jun 01, 2021
- Manual Googling: Aug 18, 2021
- iThenticate Software: Sep 30, 2021 (20%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **May 21, 2021**

Date of Peer Review: **Jun 21, 2021**

Date of Acceptance: **Sep 30, 2021**

Date of Publishing: **Jan 01, 2022**

ANNEXURE

The blood donor questionnaire was as follows:

1. Would you like to be called on your mobile phone if required?
2. Did you donate blood earlier?
If yes, how many times and last donation date
3. Did you have any difficulty during last blood donation?
4. Are you feeling well today?
5. Did you have something to eat in last four hours?
6. Did you sleep well last night?
7. Did you have any symptoms related to hepatitis/jaundice/malaria/HIV infection (AIDS) or sexually transmitted disease?
8. In last six months did you have any of the following symptom?
weight loss, repeated diarrhoea, swollen glands, continuous low grade fever?
9. In last six month did you had any history of the following?
tattoo, ear piercing, tooth extraction

10. Do you have history of following?
Heart disease, lung disease, kidney disease, cancer, epilepsy, diabetes, T.B., bleeding tendency, hepatitis B/C, jaundice (in the last one year), malaria (in the last three months), allergy, typhoid fever (in the last one year)
11. Are you taking?
Antibiotics, aspirin, alcohol, steroids, vaccinations or any other medicines
12. Any history in last six months?
Major Surgery/minor surgery or blood transfusion
13. For female donor only
Are you pregnant?
Had abortion in last six month?
Do you have a child less than one-year-old?
14. Would you like to be informed if any abnormality is detected on investigation?