Original Article

Evaluation of Blood Donor Deferral Causes:
A Retrospective Study From South India

Mourouguessine Vimal[1]*, Srinivasan Sowmya[1], Anandabaskar Nishanthi[2] and Gandhi Ramya[1]

[1]Department of Pathology, Sri Manakula Vinayagar Medical College and Hospital, Puducherry, India
[2]Department of Pharmacology, Jawarhalal Institute of Postgraduate Education and Research, Puducherry, India

Keywords: *Blood Donation, Donor Deferral, Selection Criteria, Prospective Donors*

ABSTRACT

Background: Detailed analysis of various causes for deferral of blood donors may help medical personnel to curb the barriers that impede the blood donation. This study aims to evaluate the deferral reasons of a blood donor in our centre and to uncover the hindering factors behind the target of achieving 100% acceptance of blood donors

Methods: This is a retrospective record based study over a time period of 4 years from January 2012 to December 2015.Data were collected from the Donor deferral registry with respect to age and Gender. The causes of deferral were categorized as temporary and permanent.

Result: A total of 9557 registered donors were screened and 1421 (14.87%) were deferred. Overall, men (1258; 88.5%) were deferred more than the women (163; 11.5%). But women had higher deferral rate (163/236; 69.1%) compared to Men (1258/9321; 13.5%). Temporary deferral (78.7%) was common than the permanent deferral (21.3%). Anemia with low hemoglobin was the commonest cause of temporary deferral (31.5%) in both males and females. Hypertension was the commonest cause of permanent deferral (75.8%) constituting 16.2% of the total deferrals.

Conclusion: Ensuring the confidentiality of history taking and examination of donors will help them to answer the questions honestly and to curb the barriers that impede the donation. Defining and educating the donor selection criteria to the community by the medical professionals and awareness and self motivation from the donors are the key factors behind achieving cent percent acceptance of blood donors.

***Corresponding author:**
Dr Mourouguessine Vimal, No.21, Narmatha street, Vasanth nagar, Muthialpet, Puducherry – 605003, India
Phone: +91 9994083575
Email: drvimalm@gmail.com

Introduction

Blood Transfusion Services (BTS) is the vital part of modern health care system without which efficient medical care is impossible. The reports of National AIDS Control Organisation state that in India the annual rate of blood donation is only 7.4 million against the annual requirement of 10 million units. [1] The statistics from World Health Organisation show that annually there are over 81 million units of blood are collected, but the developing nations contributes to only 39% of this magnitude where around 82% of world's population is living. [2]

The success of screening for blood donor lies in the fact that the balance should be maintained of the fact that neither the donor should pose risk by the donation nor the recipient should be exposed to the risk by receiving it. [3] Further ensuring the safety of the donors by medical examination, their confidence and trust can be won and this increase their future willingness for donation. [4]

Deferral of a donor results in loss of atleast one precious unit from a truly willing person. Further the deferral of a first time donor may have a significant impact on his attempt for subsequent donations. Hence detailed analysis of various causes for deferral of blood donors may help medical personnel and doctors to curb the barriers that impede the blood donation.

As there is a changing trend in the deferral causes as well as deferral rate in different parts of the globe, this study aims to evaluate the deferral reasons in our center and compare these reasons and rates among different parts of the nation and the world, and tries to uncover the hindering factors behind the target of achieving 100% acceptance of blood donors.

Materials and Methods

This is a retrospective record based study carried out on donors who presented to Blood bank in a Tertiary care center in southern part of India over a time period of 4 years from January 2012 to December 2015. Donors were selected in our Blood bank based on Drugs and Cosmetic Act 1940 which is supplemented by Guidelines of Directorate General of Health Services guidelines, Ministry of Health & Family Welfare (2003) and National AIDS Control Organisation (NACO). Predonation screening of the donors were done using Donor questionnaire followed by physical examination, Haemoglobin estimation and Blood grouping.

Data were collected from the Donor deferral registry with respect to age and Gender. The causes of deferral were categorized as temporary and permanent. All repeat donations were considered as independent attempts and for simplicity sake, they were not segregated from first time donations.

Results

A total of 9557 registered donors were screened during the study period. Out of them, 8136 (85.13%) were selected for blood donation and 1421 (14.87%) were deferred. Regarding the Gender distribution among the donors donated blood, 8063 (99.1%) were males and 73 (0.9%) were females. Overall, Men (1258; 88.5%) were deferred more than the women (163; 11.5%). But Women had higher deferral rate (163/236; 69.1%) compared to Men (1258/9321; 13.5%). Most of the deferred donors were in the age group of 18-30 in both males (63.75%) and females (56.44%). Overall among the deferral, Temporary deferral (78.7%) was common than the Permanent deferral (21.3%). The causes of Temporary and Permanent deferrals and their relative proportions were shown in Tables 3 and 4. Anemia with low hemoglobin was the commonest cause of temporary deferral (31.5%) in both males and females constituting 24.8% of the total deferrals. Hypertension was the commonest cause of permanent deferral (75.8%) constituting 16.2% of the total deferrals.

Table 1:Gender distribution of Registered, Selected and Deferred donors.

Donors	Males	Females	Total
Registered	9321	236	9557 (100%)
Selected	8063	73	8136 (85.13%)
Deferred	1258	163	1421 (14.87%)

Table 2: Age group of Deferred Donors and their percentage.

	MALES		FEMALES	
Age in years	Number of donors	Percentage of deferrals	Number of donors	Percentage of deferrals
<18	18	1.43	0	0
18-30	802	63.75	92	56.44
31-40	288	22.89	55	33.74
41-50	125	9.95	15	9.2
51-60	25	1.98	1	0.61
Total	**1258**	**100**	**163**	**100**

Table 3: Causes of Temporary Deferrals and their relative proportions.

Cause	Males	Females	Total Number	% of Temporary deferrals	% of total deferrals
Low Hemoglobin	226	127	353	31.5	24.8
Alcohol intake	226	0	226	20.2	15.9
Hypotension	130	8	138	12.3	9.7
Drug intake	99	4	103	9.2	7.3
Low Weight	42	4	46	4.1	3.4
Typhoid	39	0	39	3.5	2.8
Tuberculosis	6	0	6	0.5	0.4
Other Infections	24	2	26	2.3	1.7
Jaundice	11	1	12	1.1	0.8
Recent donation	26	0	26	2.3	1.8
Tatooing	12	0	12	1.1	0.8
Vaccination	41	1	42	3.8	3
Surgery	8	2	10	0.9	0.7
Menstruation	0	7	7	0.6	0.5
Fever	20	1	21	1.9	1.5
Low age	18	0	18	1.6	1.3
Allergy	14	0	14	1.3	1
Snake bite	3	0	3	0.3	0.2
Dog bite	3	0	3	0.3	0.2
Miscellaneous	13	6	9	1.2	0.9
Total	**961**	**163**	**1123**	**100**	**78.7**

Table 4: Causes of Permanent Deferrals and their relative proportions.

Cause	Males	Females	Total Numbers	% of Permanent deferrals	% of Total deferrals
Hypertension	226	3	229	75.8	16.1
Asthma	20	1	21	7	1.6
Seizures	10	2	12	4	0.8
High risk behaviour	13	0	13	4.3	0.9
Diabetes	10	0	10	3.3	0.7
Heart disease	5	4	9	3	0.6
Thyroid disease	7	1	8	2.6	0.6
Total	**291**	**11**	**302**	**100**	**21.3**

Table 5: Comparison of Total Donor deferral rate of similar studies from various countries.

Study	Study period	Total donors screened	Total Deferral rate	Country
Bahadur et al[33]	2 years		9	India
Gajjar et al[13]	2.6 years	34373	11.16	India
Taneja et al[14]	1 year	24062	17.1	India
Sareen et al[12]	3 months	8700	22.36	India
Rehman et al [34]	5 years	53950	12.4	India
Chauhan et al[2]	1.7 years	14347	4.6	India
Rabeya et al[15]	1 year	4138	5.6	Malaysia
Kasraian et al[8]	1 year	141820	30.9	Iran
Custor et al[5]	1 year	116,165	13.6	USA
Lawson et al[7]	4 months	57,003	10.8	France
Arslan et al[10]	5 years	95,317	14.6	Turkey
Lim et al[29]	4 years	278401	14.4	Singpore
Present study	4 years	9557	14.87	India

Discussion

Selection of a correct donor is the key for the success of safe Transfusion practice. Effective recruiting guidelines for blood donor can avoid unnecessary wastage of precious blood products time and human efforts. The overall deferral rate (14.8%) of donor in this study is similar to that of similar studies from India and other countries. The increased deferral rate in our studies is because of the stringent pre donor selection criteria in our blood bank and this is reflected in our very negligible seroprevalence rate of transfusion transmissible infections (2.9%) among our blood donors compared to similar other studies. In our study, temporary deferrals (78.7%) were common than the permanent deferral (21.3%). This finding is similar to that of other studies Custer et al[5] (68.5%), Shaz et al[6] (65%) Lawson et al[7] (91.3%) and Kasraian et al[8] (95.5%).

In our study, most of deferred donors (56.4%) were of the age group 18-30. Many similar studies, like Lawson et al[7] reported 50%, Radhiga et al [9] reported 59%. But Arslan et al[10] reported more deferral rate in 50 -60 age group. In our study the deferral rate in 50-60 age groups is 2.59% and this is because most of our donors were of younger age group. In this study, females had a higher deferral rate (69.1%) compared to men (13.5%). Similar deferral figures were reported by Kasraian et al,[8] Newman et al, [11] Arslan et al, [10] Shaz et al.[6] But Lawson et al[7] showed though temporary deferral rate is high among females because of increased prevalence of anemia in them, actually there is no gender difference in the permanently deferred donors.

Anemia with low hemoglobin was the commonest cause of temporary deferral in our study in both males and females and this was the commonest cause of temporary deferral in most similar studies from India. [1,2,12-13] Most studies [5,14-17] report low hemoglobin as the commonest cause for deferral. This finding supports the fact that in developing countries like India, the prevalence of clinical and subclinical anemia is very high. Anemia is common in females of reproductive age group because of menstrual disorders and pregnancy related iron loss. But anemia in males and post-menopausal females signifies underlying medical illness and warrants proper evaluation and treatment.[18] Implementation of screening programmes and treatment for anemia at community blood centers can reduce the burden of low hemoglobin deferrals and can produce more healthy donors. [19-21] We had set a cut of value of 12.5% for hemoglobin as per NACO guidelines and this can be the reason for deferring many donors whose hemoglobin was between 12 to 12.4 gm%. Thus minimal reduction in the hemoglobin level of 12gm% for accepting atleast female donors can help blood banks to accept many donors who are at this range and they can fulfill the ever rising demand of blood products to some extent. [22]

Frequent donors are at risk of depleted iron stores [23] and donation of one unit of blood results in loss of 236mg of Iron. [24] Hence implementing an iron conservation programme for the blood donors may prevent the depletion of iron stores in frequent donors. [25-27] While anemia remains the most common cause of donor deferral in most donor deferral studies, the cause was different in Lim et al [28] - recent ingestion of medication, Kasraian et al[8] and Maghsoudlou et al[29] – High risk behaviour, Arslan et al[10] – Sore throat/Common cold, Cheraghali et al[30] – Hypotension, Reikvam et al[25] - Intercurrent illness.

The second most common cause remained diverse among different studies depending on the community based demographical factors. In our study uncontrolled Hypertension (16.11%) remained the second most common cause of deferral and most common cause of permanent deferral and it constituted to 75.8% of the total permanent deferrals. This is because most of our donors are from the rural community and they lack awareness about signs and symptoms of hypertension and seldom goes for annual checkup. Girish et al[31] reported highest hypertensive donor deferrals (39.95%) and Gajjar et al, [12] Taneja et al, [13] Bahadur et al, [32] Sundar et al[16] also came with similar findings. This should be taken as alerting signal to initiate the need for starting a screening programme at a community level to detect this underdiagnosed epidemic which is often called as a “Silent Killer”.

Rehman et al[33] reported Malaria and Arslan et al[10] reported Common cold to be the second most common cause of deferral and Bobati et al, [34] Bahadur et al, [32] Shah et al[35] reported alcohol consumption within 72 hours was the second leading cause of deferral. However in our study this was the third most common cause contributing to 15.9%. The incidence of alcohol consumption has risen in the past and almost 11% of the total Indian population is indulged in binge drinking. [34] This has to be viewed seriously and steps has to be taken at the root level inculcating moral values to the children and educating the adult population about the ill effects of alcohol. 138 (9.7%) of our donors were deferred because of hypotension. Hypotension and bradycardia can occur as a complication of blood donation as a result of vasovagal reaction. [36] Though there is no current evidence that hypotensive donors have higher risk of adverse events, [37] because of higher incidence of syncope attacks following blood donation may have negative impact on a donor and the relatives about blood donation.

Intake of medications either for an acute or chronic illness constituted 7.3% of our deferred donors and nearly half of them were taking native medications for chronic diseases.

Unnikrishnan et al[38] reported a highest percentage of medication related deferrals (15.15%).

We deferred 3.4% of our donors because of low weight and this denotes the poor nutrition and health status of the donors from low socio economic status. Among the total number of deferred donors, 1.3 % were because of low age and they were encouraged by us to come for blood donation after attaining 18 years of age. This indicates that there is enthusiasm among the younger population about blood donation, but the awareness about the criteria for blood donation is lacking in them. Hence steps must be taken to bridge the gap between enthusiasm and knowledge.

We had deferred 1% of our donors with recent history of tattooing. Tatooing has been associated with higher magnitude of transfusion transmissible association because of its association with drug addiction and high risk behaviour. [34] In India, the deferral period for Tatooing is 1 year. But the American Red cross criteria accepts tattooed donor if sterile needle and ink was applied during the procedure. [8] But in developing countries like India, this may not be applicable because the medical personnel cannot judge the sterility of the needle used and often have difficulty in judging the time duration of the tattooing based on the donor's statement. Other causes for temporary deferral were Infections including tuberculosis, typhoid, recent donation within 3 months, jaundice, Vaccination, recent major surgery, menstruation, allergy, snake and dog bites. Miscellaneous causes which constituted minor percentage were recent smoking, old age and unwillingness for donation.

We reported an overall permanent deferral rate of 21.3%. The permanent deferral rate in various other studies were - Rehman et al[33] – 36.3%, Custer et al [5] – 10.6%, Arslan et al[10] – 10%. Seizures, chronic heart disease, thyroid diseases and asthma contributed to the other major causes of permanent deferrals in our study which was comparable with these studies.

As most of the deferrals in our study is because of temporarily modifiable factors, the deferred donors were counselled regarding the cause for deferral and they were encouraged to return back for blood donation after correcting the deferred cause.

Kasraian et al[8] found a higher deferral rate among first time donors (48.1%) when compared to repeated donors(13.1%). This may be because repeat donors will have more awareness about blood donation screening criteria and take more precautionary steps before coming to donate blood. On the contrary there is a hidden danger of hiding the true history to avoid being rejected.

Though the donor deferral rate of this study is similar to that of other studies, the individual causes and their proportions are different and this is because of variation in the demographic profile of the donors and varying donor selection criteria among different centres. There should be a regular follow up and efficient management of temporary donors and they can be compensated for the increasing demand of the blood donors.

Conclusion

To meet the ever rising demand for blood products, blood banks should effectively recruit new donors and maintain the existing donors. Though donor education alone cannot produce better donor educating the community about the donor selection criteria and its significance and curbing the myths and social stigma about blood donation may help to reduce the deferral rate to a great extent. Also ensuring the confidentiality of history taking and examination of donors will help them to answer the questions honestly and to curb the barriers that impede the donation. Similar studies at different parts of the nation with a large sample size will help to identify the deferral rate and its root cause at a national level. Defining and educating the donor selection criteria to the community by the medical professionals and awareness and self-motivation from the donors are the key factors behind achieving cent percent acceptance of blood donors.

Funding

None

Competing Interests

None Declared

References

1. Sareen R, Gupta GN, Dutt A, Sareen R, Gupta GN, Dutt A. Donor awareness: key to successful voluntary blood donation. F1000Research 2012. 1;29
2. Chauhan D, Desai K, Trivedi H, Agnihotri A. Evaluation of blood donor deferral causes: a tertiary-care center-based study. Int J Med Sci Public Health. 2015;1.
3. Van der Bij AK, Coutinho RA, Van der Poel CL. Surveillance of risk profiles among new and repeat blood donors with transfusion-transmissible infections from 1995 through 2003 in the Netherlands. Transfusion (Paris). 2006;46(10):1729–36.
4. Nguyen DD, Devita DA, Hirschler NV, Murphy EL. Blood donor satisfaction and intention of future donation. Transfusion (Paris). 2008 Apr;48(4):742–8.
5. Custer B, Johnson ES, Sullivan SD, Hazlet TK, Ramsey SD, Hirschler NV, et al. Quantifying losses

to the donated blood supply due to donor deferral and miscollection. Transfusion (Paris). 2004 Oct;44(10):1417–26.

6. Shaz BH, James AB, Hillyer KL, Schreiber GB, Hillyer CD. Demographic variations in blood donor deferrals in a major metropolitan area. Transfusion (Paris). 2010 Apr;50(4):881–7.
7. Lawson-Ayayi S, Salmi LR. Epidemiology of blood collection in France. Eur J Epidemiol. 1999 Mar;15(3):285–92.
8. Kasraian L, Negarestani N, Kasraian L, Negarestani N. Rates and reasons for blood donor deferral, Shiraz, Iran. A retrospective study. Sao Paulo Med J. 2015 Feb;133(1):36–42.
9. Radhiga ST, Kalpana S, Selvakumar, Natarajan MV. Evaluation of Deferral Causes Among Voluntary Blood Donors in Chennai –A Retrospective Study. Int J Med Health Sci. 1357925221;2(1):42–7.
10. Arslan O. Whole blood donor deferral rate and characteristics of the Turkish population. Transfus Med Oxf Engl. 2007 Oct;17(5):379–83.
11. Newman B. Blood donor suitability and allogeneic whole blood donation. Transfus Med Rev. 2001 Jul;15(3):234–44.
12. Gajjar H, Shah FR, Shah NR, Shah CK. Whole blood donor deferral analysis at General hospital blood bank–A retrospective study. Medicine (Baltimore). 2014;235:6–13.
13. Taneja K, Bhardwaj K, Arora S, Agarwal A. Analysis of the reasons for deferral of prospective blood donors in a Tertiary Care Hospital in North India. J Appl Hematol. 2015;6(4):154.
14. Rabeya Y, Rapiaah M, Rosline H, Ahmed SA, Zaidah WA, Roshan TM. Blood pre-donation deferrals--a teaching hospital experience. Southeast Asian J Trop Med Public Health. 2008 May;39(3):571–4.
15. Charles KS, Hughes P, Gadd R, Bodkyn CJ, Rodriguez M. Evaluation of blood donor deferral causes in the Trinidad and Tobago National Blood Transfusion Service. Transfus Med. 2010 Feb 1;20(1):11–4.
16. Sundar P, Sangeetha SK, Seema DM, Marimuthu P, Shivanna N. Pre-donation deferral of blood donors in South Indian set-up: An analysis. Asian J Transfus Sci. 2010 Jul;4(2):112–5.
17. Agnihotri N. Whole blood donor deferral analysis at a center in Western India. Asian J Transfus Sci. 2010;4(2):116.
18. Mast AE. Low hemoglobin deferral in blood donors. Transfus Med Rev. 2014;28(1):18–22.
19. Radtke H, Tegtmeier J, Röcker L, Salama A, Kiesewetter H. Daily doses of 20 mg of elemental iron compensate for iron loss in regular blood donors: a randomized, double-blind, placebo-controlled study. Transfusion (Paris). 2004 Oct;44(10):1427–32.
20. Gordeuk VR, Brittenham GM, Bravo J, Hughes MA, Keating LJ. Prevention of iron deficiency with carbonyl iron in female blood donors. Transfusion (Paris). 1990 Mar 4;30(3):239–45.
21. Magnussen K, Bork N, Asmussen L. The effect of a standardized protocol for iron supplementation to blood donors low in hemoglobin concentration. Transfusion (Paris). 2008 Apr 1;48(4):749–54.
22. Gandhi MJ, Duffy K, Benike M, Jenkins S, Stubbs JR. Effect of increasing hemoglobin cutoff in male donors and increasing interdonation interval in whole blood donors at a hospital-based blood donor center. Transfusion (Paris). 2012 Sep;52(9):1880–8.
23. Mittal R, Marwaha N, Basu S, Mohan H, Ravi Kumar A. Evaluation of iron stores in blood donors by serum ferritin. Indian J Med Res. 2006 Dec;124(6):641–6.
24. Cançado RD, Chiattone CS, Alonso FF, Langhi Júnior DM, Alves R de C. Iron deficiency in blood donors. São Paulo Med J Rev Paul Med. 2001 Jul 5;119(4):132–134; discussion 131.
25. Reikvam H, Svendheim K, Røsvik AS, Hervig T, Reikvam H, Svendheim K, et al. Questionnaire-Related Deferrals in Regular Blood Donors in Norway, Questionnaire-Related Deferrals in Regular Blood Donors in Norway. J Blood Transfus J Blood Transfus. 2012 Jan 17;2012, 2012:e813231.
26. Røsvik AS, Hervig T, Wentzel-Larsen T, Ulvik RJ. Iron status in Norwegian blood donors: comparison of iron status in new blood donors registered in 1993-1997 and in 2005-2006. Vox Sang. 2009 Jan;96(1):49–55.
27. Røsvik AS, Ulvik RJ, Wentzel-Larsen T, Hervig T. The effect of blood donation frequency on iron status. Transfus Apher Sci Off J World Apher Assoc Off J Eur Soc Haemapheresis. 2009 Dec;41(3):165–9.
28. Lim JC, Tien SL, Ong YW. Main causes of pre-donation deferral of prospective blood donors in the Singapore Blood Transfusion Service. Ann Acad Med Singapore. 1993 May;22(3):326–31.
29. Maghsudlu M, Makipour M, Nasizadeh S. Evaluation of deferral causes of blood donors and relevant factors. The Scientific Journal of Iranian Blood Transfusion Organization. 2006;3(1):9-16.

30. Cheraghali A. Overview of blood transfusion system of iran: 2002-2011. Iran J Public Health. 2012;41(8):89–93.
31. Girish CJ, Chandrashekhar TN, Ramesh BK, Kantikar SM. Pre-donation deferral of whole blood donors in district transfusion centre. J Clin Diagn Res. 2012;6(1):47–50.
32. Bahadur S, Jain S, Goel RK, Pahuja S, Jain M. Analysis of blood donor deferral characteristics in Delhi, India. Southeast Asian J Trop Med Public Health. 2009 Sep;40(5):1087–91.
33. Rehman S, Arif SH, Mehdi G, Mirza S, Saeed N, et al. The Evaluation of Blood Donor Deferral Causes: A Tertiary Care Centre-based Study. J Blood Disorders Transf. 2012;3:131.
34. Bobati SS, Basavraj V, Prakash P, others. Analysis of predonation loss of blood donors due to deferrals-in a tertiary care hospital set up. Int J Health Allied Sci. 2016;5(1):15.
35. Shah SD, Shah MC, Bhatnagar NM, Gajjar MD, Soni SA, Patel TR. Analysis of blood donor deferral characteristics in a tertiary care hospital in a Blood Bank – A review. Southeast Asian J Case Rep Rev. 2013;2(5):389–95.
36. Crocco A, D'Elia D. Adverse reactions during voluntary donation of blood and/or blood components. A statistical-epidemiological study. Blood Transfus. 2007 Jul;5(3):143–52.
37. Pauwels NS, Cusack L, De Buck E, Compernolle V, Vandekerckhove P. The effect of pre-donation hypotension on whole blood donor adverse reactions: a systematic review. J Am Soc Hypertens. 2014 Jun;8(6):429–36.
38. Unnikrishnan B, Rao P, Kumar N, Ganti S, Prasad R, Amarnath A, et al. Profile of blood donors and reasons for deferral in coastal South India. Australas Med J. 2011 Jul 31;4(7):379–85.