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A study of whole blood donor deferrals in the blood bank of a rural medical college in India

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Abstract

Introduction: To provide safe blood to the recipients, proper donor selection and deferral is as important as screening of blood bags for various transfusion transmissible infections (TTI).

Aims and Objectives: To study and analyse various causes & rate of pre-donation deferral of blood donors and to take proper follow up actions to decrease the temporary deferral rate without compromising blood quality and recipient's safety, thus retaining prospective blood donors and preventing loss of precious blood.

Materials and Method: A retrospective study of various causes of pre-donation deferral of whole blood donors in the blood bank of our institute was done. Records of all deferrals of Financial Year 2012 to 2016 (4 years) were reviewed and analysed.

Results: A total of 6633 potential blood donors were registered during the study period which includes 6474 males (97.6%) and 159 females (2.4%) with 5840 Voluntary and 793 Replacement donations. Out of which, a total of 273 donors (4.11%) were deferred due to various reasons. Among these, 235 were Temporary (86.08%) and 38 were Permanent deferrals (13.92%). The main reason for temporary deferral is Low Haemoglobin; while for permanent deferral is Hepatitis B Positivity.

Conclusion: The donor deferral rate obtained in our study is 4.11% which is quite good as compared to higher deferral rates of some other studies. Majority of the donors were males, so encouragement and motivation of female donors is equally important to increase the overall donor pool. Temporary deferrals were more as compared to permanent deferrals. So by counselling and educating the temporary deferred donors regarding some common causes of temporary deferrals and deferral period, they can be brought back for future donations. The Leading causes of permanent deferrals were Transfusion Transmissible Infections (HBV, HIV, HCV). So proper counselling is also necessary to prevent them from donating blood for the safety of the recipient. In this ways, a pool of healthy blood donors can be increased without compromising quality of blood and safety of the recipients as well as donors.

Keywords: Whole blood donor, Blood bank, Deferral, Temporary, Permanent.

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Introduction

Human blood is very precious but unfortunately it can't be manufactured in factories just like drugs. So the only way to maintain inventory in any blood bank is blood donation by healthy donors. They may be voluntary or replacement donors. Voluntary donors are those who donate blood in good faith for the patient without expecting anything in return. While, replacement donors are mostly the family members or friends of the patient who donate blood to compensate the stored blood used for their patient. All voluntary and replacement blood donors have to pass through predefined health screening before donation to determine their eligibility and suitability of donating blood. This screening is mandatory for quality of blood and safety of both, the recipient as well as the donor. Besides, collection of blood from non-remunerated repeat voluntary blood donors instead of paid professional donors is equally important.[1,2] For the safety of the donor, it is necessary to check whether he is fit enough to tolerate the procedure. While for the safety of recipient, it is must to ensure that the donor is not suffering from any Transfusion Transmissible Infection. Based on this screening, many donors are rejected temporarily or permanently, as the case may be, from donating blood. They are called 'deferred donors'. Among these, many temporary deferred donors usually left with a negative impression assuming they have been rejected for lifetime and are less likely to return for future blood donation.[3,4] According to National AIDS Control Organization (NACO) in India, during FY 2016-17, annual blood collection was 7.05 million units against the requirement of 12.8 million units (1% of total population).[5] So the shortfall is approximately 45%. In this scenario of blood shortage, a uniform donor selection and deferral policy is developed by various agencies to decrease this shortfall.[6,7,8] So for preventing unnecessary deferral of healthy donors and re-recruiting and motivating temporary deferrals for future blood donations, adequate knowledge of deferral causes and rates is of prime importance.[9,10] The main aims and objectives of this study is to analyse various causes & rates of pre-donation deferral of blood donors and to take proper follow up actions to decrease the temporary deferral rate without compromising blood quality and recipient's safety. Thus helps in maintaining a sufficient inventory of whole blood in rural medical institutes by

increasing availability of prospective healthy blood donors through their proper counselling and guidance.

Materials and Method

This retrospective study was conducted in the hospital based blood bank of our rural Medical College. Four year's records of all whole blood donors including voluntary and replacement blood donations in the blood bank as well as in outdoor camps from April-2012 to March-2016 (FY 2012 to 2016) were reviewed and the data was analysed. The criteria for prospective blood donor selection and deferral in India are provided by the Drugs and Cosmetic Act 1940 & Rules 1945 supplemented by the Standards for Blood Banks and Blood Transfusion Services by National AIDS Control Organisation (NACO) and Transfusion Medicine Technical Manual by Ministry of Health and Family Welfare (MoHFW), Government of India (GOI). These agencies laid down a questionnaire for screening of all blood donors (Annexure I), in which every prospective donor is required to give their demographic data as well as answer all questions related to their status of health. After taking proper 'health history', a limited General Physical Examination was done measuring Pulse, Blood Pressure, Temperature, Weight and Haemoglobin (Hb). Screening for haemoglobin was done by Specific Gravity method by Copper Sulphate solution. It was re-checked by Sahli's Method or by Abacus 3 part Cell Counter in case of query in any donor. Some basic cut-off provided by NACO for blood donor selection are; Age: 18-65 years, Weight: $\geq$ 45 Kg, Pulse: 60-100 beats/minutes, Blood Pressure (BP): Systolic: 100-180 mmHg, Diastolic: 50-100 mmHg, Temperature: $\leq$ 37.5 ^{0}C and Hb: $\geq$ 12.5 gm%. So all the prospective blood donors were accepted or deferred (temporarily or permanently) according to Standard Operating Procedure (SOP) prepared on the bases of various criteria laid down by above agencies. Temporarily deferred donors were deferred for a specific time period according to diseases or conditions they had which were curable or last for temporary period and after which they again become eligible for blood donation. While permanently deferred donors were deferred or rejected for lifetime because the diseases or conditions were not curable or tends to remain for lifetime. Records of all donors were reviewed and analysed according to age, sex and type of donor (voluntary or replacement) and reasons for deferral were categorised into temporary and permanent with their absolute and relative proportions.

Annexure I: Blood Donor Questionnaire

Blood Donor Registration & Consent Form

- Name and address of the Blood Bank_____
- License No._____ Blood Unit No._____
- (√) Tick wherever applicable.
- Pl. answers the following questions correctly. This will help to protect you & the patient who receives your blood.
- Name: _____Male/Female,
- Date of Birth_____ Age_____
- Occupation_____ Address_____ Mobile No._____
- Have you donated previously: Yes /No
- If yes, on how many occasions:_____ When last:_____
- Your blood group:_____ Time of last meal:_____
- Did you have any discomfort during/after donation? Yes /No

1. Do you feel well today?: Yes /No
2. Did you have something to eat in the last 4 hours?: Yes/ No
3. Did you sleep well last night?: Yes /No
4. Have you any reason to believe that you may be infected: by either Hepatitis, Malaria,
8. Is there any history of surgery or blood transfusion in the past 6 months?

Major Surgery Minor Surgery Blood Transfusion

9. For women donors,
   - Are you pregnant?: Yes / No
   - Have you had an abortion in the last 3 months?: Yes /No
   - Do you have a child less than one year old?: Yes/ No
   - Is the child still breast-feeding?: Yes/ No
   - Are you having your periods today?: Yes/ No
10. Would you like to be informed about any abnormal test result at the address furnished by you?: Yes/ No
11. Have you read and understood all the information presented and answered all the questions truthfully?, as any incorrect statement or concealment may affect your health or may harm the recipient.: Yes/ No

I understand that

a. Blood donation is a totally voluntary act and no inducement or remuneration has been offered.
b. Donation of blood/components is a medical procedure and that by donating voluntarily, I accept the risk associated with this procedure.
c. My blood will be tested for Hepatitis B, Hepatitis C, Malarial parasite, HIV/AIDs and venereal diseases in addition to any other screening tests required to

HIV/AIDS, and/or venereal disease? Yes/ No 5. In the last 6 months have you had any history of the following: Unexplained weight loss Repeated Diarrhoea Swollen glands Continuous low-grade fever 6. In the last 6 months have you had any:- Tattooing Ear Piercing Dental Extraction 7. Do you suffer from or have suffered from any of the following diseases? Heart Disease Lung disease Kidney Disease Cancer/Malignant Disease Epilepsy Diabetes Tuberculosis Abnormal bleeding tendency Hepatitis B/C Allergic Disease Jaundice Sexually Trans. Diseases Malaria Typhoid (last 1 yr.) Fainting spells – Are you taking or have taken any of these in the past 72 hours? Antibiotics Aspirin Alcohol Steroids Vaccinations Dog Bite/Rabies vaccine (1 yr.)	ensure blood safety. I hereby voluntarily consent to donate my blood/blood components to be used as directed by the Blood Bank as per policy of the Govt. for the blood safety. Date:_____Time:_____Donor's Signature:_____ **General Physical Examination: (To be filled by Blood bank staff)** Weight:_____Kg. Pulse:____Beats/Min. BP:____/____mmHg Temperature:_____ ºC Hb:_____gm% **Accept / Defer** Reason: _____ Tapping done by:_____ Blood Group:_____ Signature of Medical Officer:_____ **@ Blood safety begins with a Healthy Donor @**

Results

A total of 6633 prospective blood donors were registered in the blood bank of our rural medical college during four year time period. Among which 6474 (97.6%) were males and 159 (2.4%) were females. Out of 6633 blood donors, 5840 were voluntary donors (88%) while 793 were replacement donors (12%). Total in-house (in blood bank) blood donation was 4073 (61.4%) which includes all replacement donors (793) and some part of voluntary donors (3280). Total outdoor camp donors (voluntary only) were 2560 (38.6%). All this demographic data is shown in Table 1.

Table 1: Whole Blood Donor's Data for FY 2012 to 2016

Financial Year	Total Donors Registered	Male	Female	Voluntary Donors		Replacement Donors	Deferred Donors		Repeat Donors	
				In Blood Bank	*In Camp*	*In Blood Bank only*	*Male*	*Female*	*Male*	*Female*
2012-13	734	713	21	302	215	217	27	12	24	3
2013-14	1350	1283	67	606	641	103	54	14	68	9
2014-15	1973	1923	50	870	830	273	83	15	114	5
2015-16	2576	2555	21	1502	874	200	64	4	111	4
Total	6633	6474	159	3280 (49.4%)	2560 (38.6%)	793 (12%)	228	45	317	21
Grand Total	6633 (100%)	6474 (97.6%)	159 (2.4%)	5840 (88%)		793 (12%)	273 (4.1%)		338 (5%)	

Out of 6633, total 273 (4.11%) donors were deferred due various reasons including 228 males (3.43%) and 45 females (0.68%) along with their gender specific deferral proportions as depicted in Table 2.

Table 2: Gender Specific Blood Donor Deferral Distribution

Gender	Total Donors Registered	Deferred Donors	% Deferrals of total donors	Gender specific % deferrals
Male	6474	228	3.43	3.52
Female	159	45	0.68	28.30
Total	6633	273	4.11	---

These 273 deferrals were further divided into 235 temporary deferrals (86.08%) and 38 permanent deferrals (13.92%) along with their relative proportions to total registrations as shown in Table 3.

Table 3: Temporary and Permanent Deferral Distribution

Type of Deferral	No. of Deferrals	% of Total Deferrals	% Deferrals of Total Donors Registered
Temporary	235	86.08	3.54
Permanent	38	13.92	0.57
Total	273	100	4.11

Table 4 shows demographic distribution of various reasons for temporary deferrals. Out of 235 temporary deferrals, 197 were male and 38 were females. Low Haemoglobin (34.05%) was the commonest reason among temporary deferrals followed by Under Weight (16.18%), High BP (13.19%) and some others. Whereas out of 38 permanent deferred donors (31 males & 7 females), the top most reason was Hepatitis B Positivity constituting (26.31%) followed by HIV (18.42%), Hepatitis C (15.79%) and some others (Table 5).

Table 4: Reasons for Temporary Deferrals with Demographic Distribution & Proportion

Reasons for Temporary Deferral	Male	Female	Total	% of Temporary Deferral	% of Total Deferral
Low Haemoglobin	67	13	80	34.05	29.3
Under Weight	31	7	38	16.18	13.92
High Blood Pressure	27	4	31	13.19	11.36
Jaundice	16	2	18	7.66	6.6
Under Age	13	2	15	6.39	5.5
Medication	12	1	13	5.54	4.8
Surgical Procedure	8	1	9	3.82	3.3
Alcohol	8	0	8	3.4	2.9
Skin Disease	7	1	8	3.4	2.9
Low Blood Pressure	5	3	8	3.4	2.9
Menstruation	0	4	4	1.7	1.5
Previous Donation <3months	3	0	3	1.27	1.1
Total	197	38	235	100	86.08

Table 5: Reasons for Permanent Deferrals with Demographic Distribution & Proportion

Reasons for Permanent Deferral	Male	Female	Total	% of Permanent Deferral	% of Total Deferral
Hepatitis B	8	2	10	26.31	3.67
HIV	6	1	7	18.42	2.56
Hepatitis C	4	2	6	15.79	2.2
Cardiac Disease	4	1	5	13.16	1.83
Asthma	3	1	4	10.53	1.47
Chronic Renal Disease	3	0	3	7.9	1.1
Diabetes	2	0	2	5.26	0.73
Malignancy	1	0	1	2.63	0.36
Total	31	7	38	100	13.92

Discussion

The donor deferral rate ranged from 5.1% - 19.2% across the world in various international and national studies.[10-17, 19,20] however in present study, out of 6633 registered blood donors, total 273 donors were deferred due to various reasons constituting 4.11% deferral rate, which is quite comparable to some studies by other researchers of South Asian Countries who have reported a nearby lower deferral rates; 5.1% by John et al[11] (India), 5.6% by Rabeya et al[12] (Malaysia) and 7.2% by Patil et al[13] (India). While some studies from West Asian, European and Western Countries showed a quite higher deferral rates; 19.2 % by Bashawri et al[14] (Saudi Arabia), 14.6% by Arslan et al[15] (Turkey), 13.6% by Custer et al[16] (USA) and 10.8% by Lawson et al[17] (France). Few studies from India and Pakistan also showed higher deferrals rates. Deferral rate comparison of various studies is shown in Table 6. The deferral rate may vary from country to country and region to region. These could be due to different donor

selection criteria in different countries like Age, Weight, Haemoglobin levels, Blood donation interval, Endemicity of transmittable diseases, High risk behaviour, religious restriction on blood donation etc.

In our study 97.6% of the donors were males while only 2.4% were females. Similar rate has been reported by Pandey et al & Rehman et al.[9,10] These lower rates of female donations were might be because of prevalence of anaemia among rural female population, socio-cultural & socio-economic factors, ignorance, lack of awareness & motivation for blood donation. In present study, the deferred donors were divided into temporary (86.08%) and permanent (13.92%) deferrals. Quite similar rates were reported by Arslan et al[15] constituting 90% temporary and 10% permanent deferrals, while comparatively lower rate of 62.8% for temporary & higher rate of 37.2% for permanent deferrals were mentioned by Srivastava et al.[18] The leading reason of temporary deferral in our study was Low Haemoglobin level comprising of 34.05% of temporary deferrals which was comparable to study done by Khurram et al[19] (33.7%). On the contrary, comparatively higher deferral rates of 45.31% for haemoglobin were reported by Annam et al[20] while Rehman et al and John et al reported lower rates of 17.9% and 15.6% respectively. The main reason for low haemoglobin in rural population could be poor nutrition due to lower socio-economic status. Second common reason for temporary deferral was Underweight (16.1%), almost similar with findings of Bashawri et al[14] (14.6%). In contrast, some other studies showed comparatively lower deferral rate of around 5% for Underweight.[10,11,13,19] Improper diet and poor nutrition could be the reason for underweight in rural area. We reported High BP (13.1%) as the third main cause of temporary deferral in contrast to lower rate (average 4%) reported by other studies.[10.14,19] It was also noted that some authors have counted High BP as a reason for Permanent Deferral[11,13,18,20] which is a point of debate. Among donors deferred due to High BP, not all were true hypertensive. Some could be due to stress, exercise or apprehension of needle and doctor. Other causes of temporary deferrals in descending order were History of Jaundice within last 1 year, Under Age (less than 18 years), consumption of aspirin or antibiotic or medication in last 3days, Surgical Procedure in last 6 months, Alcohol within last 72 hours, Skin Disease, Low Blood Pressure, Menstruation, Previous Donation within 3months etc. which were also reported in various studies. In rural area, Low BP could be due to increased starvation, excessive fluid loss or heat stroke during labour work.

Transfusion Transmissible Infections (HBV, HIV & HCV) accounted for the commonest cause of permanent deferral in our study. They together constituted 60.5% of permanent deferrals which was comparable to studies done by John et al & Khurram et al.[11,19] Among which, Hepatitis B is the topper followed by HIV and Hepatitis C. Transfusion of blood withdrawn from these donors carries highest risk to the recipients. So we should remain more stringent while screening them, particularly eliciting history of tattooing, piercing, high risk behaviour etc. Other causes of permanent deferrals were Cardiac Disease, Asthmatic on steroid, Chronic Renal Disease, Diabetics on insulin, Malignancy etc. which were also documented by other studies.

The major problem with temporary deferred donors was a negative psychological impression on the assumption of being rejected for lifetime and they are less likely to return for future blood donation. Therefore all temporarily deferred donors must be properly counselled about the cause and deferral period so that they can get the cause rectified and return for future donations. Donors deferred due to Low Haemoglobin should be referred of further evaluation and treatment. Studies have shown that by lowering haemoglobin standard levels and offering iron treatment for pre-menopausal woman could increase female eligibility.[21]

Table 6: Comparison of Deferrals of Present Study to Other Studies[10-17, 19,20]

Studies	Year of Publication	Country	Total Donors	Deferred Donors	% of Deferred Donors
Lawson et al[17]	1999	France	64092	6921	10.8
Custer et al[16]	2004	USA	116165	15798	13.6
Bashawri et al[14]	2005	Saudi Arabia	33900	6508	19.2
Arslan et al[15]	2007	Turkey	95317	13916	14.6
Rabeya et al[12]	2008	Malaysia	4138	231	5.6
Rehman et al[10]	2012	India	53950	6690	12.4
Annam et al[20]	2014	India	933	85	9.1
John et al[11]	2015	India	16805	858	5.1
Khurram et al[19]	2016	Pakistan	25901	3156	12.2
Patil et al[13]	2017	India	1267	92	7.2
Present Study	---	India	6633	273	4.1

Conclusion

The donor deferral rate obtained in our study is 4.11% which is comparable to some studies. However some have reported much higher rates which could be due to different donor selection criteria in different countries. Major chunk of the donors were males while females constituted only 2.4% of the total blood donation. So female participation should be increased by decreasing social, economic & cultural hurdles which prevent them from donating. Temporary deferrals occupy major portion of total deferrals as compared to permanent deferrals. The main reasons for temporary deferrals were Low Haemoglobin, Underweight, High BP and some others. So efforts should be made to clearly inform the donors regarding their deferral reasons and period. It should also be emphasized to counsel and ensure them that the deferral is temporary and encourage them to safely return for donation in future after rectification of the cause without worrying about their deferral status. Educating the community people regarding some common causes of temporary deferrals like abstaining from smoking and alcohol, age limit, menstruation, breastfeeding women, drugs consumption before donation etc. may help pre-screen themselves and avoid unnecessary deferrals. The Leading causes of permanent deferrals were Transfusion Transmissible Infections (TTI) (HBV, HIV, HCV) and some major systemic illnesses. Proper counselling is also necessary for permanently deferred donors about their disease. They should be strictly advised not to donate blood to protect safety of the recipient and to some extent their own safety. In this ways, a pool of healthy donors can be increased without compromising quality of blood and safety of the recipients as well as donors.

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Conflict of Interest

None declared

References

1. Davey RJ. Recruiting blood donors: Challenges and opportunities. Transfusion.2004;44:597–600.
2. Domen RE. Paid-versus-volunteer blood donation in the United States: A historical review. Transfus Med Rev. 1995;9:53–9.
3. Custer B, Chinn A, Hirschler NV, Busch MP, Murphy EL. The consequences of temporary deferral on future whole blood donation. Transfusion 2007;47(8):1514-1523.
4. Zou S, Masavi F, Noyary EP, Rios JA, Trouern-Trend J, Fang CT. Donor deferral and resulting donor loss at the American Red Cross Blood Services,2001 through 2006. Transfusion 2008;48:2531-9.
5. Blood transfusion services/ Achievements. National AIDS Control Organisation (NACO), Ministry of Health and Family Welfare (MoHFW), Government of India (GOI). Available at: http://naco.gov.in/blood-transfusion-services.
6. Donor selection and blood collection. In: R.K. Saran: Transfusion Medicine Technical Manual, 3rd edition 2003, MOHFW, GOI; p 7-20.
7. Criteria for blood donation. Drugs and Cosmetic Act 1940 & Rules 1945, MoHFW, GOI; p 274.
8. Donor selection. Standards For Blood Banks & Blood Transfusion Services, NACO, MoHFW, GOI, New Delhi. 2007; p 19-24.
9. Pandey HC, Chaudhary R, Elhence P, Verma A et al. Evaluation of individuals deferred from blood donation for medical reasons. Asian J Transfus Sci 2011;5:63-109.
10. 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.
11. F John, M RVarkey. Evaluation of blood donor deferral causes in a tertiary hospital, South India. International Journal of Biomedical and Advance Research 2015;6(03):253-258.
12. Rabeya Y, Rapiaah M, Rosline H, Ahmed S et al. Blood pre-donation deferrals-a teaching hospital experience. Southeast Asian Journal of Tropical Medicine and Public Health 2008;39:571.
13. SB Patil, Anushree CN, Neeta PN, Sujatha R. Blood donor deferrals in a tertiary care teaching hospital blood bank in Banglore- A retrospective study. Indian Journal of Pathology and Oncology 2017;4(1):135-138.
14. Layla A.M. Bashawri. A review of predonation blood donor deferrals in a university hospital. J Family Community Med. 2005;12(2):79–84.
15. Arslan O. Whole blood donor deferral rate and characteristics of the Turkish population. Transfus Med 2007;17:379-383.
16. Custer B, Johnson ES, Sullivan SD, Hazlet TK, Ramsey SD, et al. Quantifying losses to the donated blood supply due to donor deferral and miscollection. Transfusion 2004;44:1417-1426.
17. Lawson-Ayayi S, Salmi LR. Epidemiology of blood collection in France. Eur J Epidemiol 1999;15:285-292.
18. M Shrivastava, N Shah, S Navaid, K Agarwal, G Sharma. Blood donor selection and deferral pattern as an important tool for blood safety in a tertiary care hospital. Asian J Transfus Sci. 2016;10(2):122–126.
19. S. Khurram, M. Borhany, N. Anwar, I. Naseer et al. Frequency and reasons of donor deferral prior to blood donation process: a single centre experience. Transfusion Medicine 2017;27:10–15.
20. V Annam, N Mohan, Lakshmi R, Mrinalini V et al. Evaluation of Pre-donation Deferral Causes in Whole Blood Donor Population at a Tertiary Rural Health Centre. International Journal of Science and Research 2014;7(3):668-671.
21. Newman BH. Adjusting our management of female blood donors: the key to an adequate blood supply. Transfusion 2004;44:591-6.