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Original Research Article

Analysis of Donor Deferral Rate and its Various Causes in Voluntary and Replacement Blood Donors in Jammu, India

Sushant Kumar Meinia[1], Vijay Sawhney[2]

[1]MD, Immuno-haematology and Blood Transfusion Medicine, GMC Jammu, India.
[2]Professor and Head, PG Dept. of Immuno-haematology and Blood Transfusion Medicine, GMC Jammu, India.

Corresponding Author: Sushant Kumar Meinia

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ABSTRACT

Background: Donor Deferral is a painful and sad experience for blood donor as well as the transfusion centre and it necessitates additional efforts towards new recruitments. Pre-donation donor selection is done for the safety of the blood donor and recipient. To ensure the safety of blood supplied by the blood bank to patients, it is paramount that all blood donors are in good health. This ensures the donor is protected by his/her own health and the recipient is protected against transfusion transmissible diseases, drugs or contaminated products that would be detrimental to their health.
Objectives: To analyse the donor deferral rate and its various causes in Voluntary and Replacement Blood Donors.
Materials and Methods: A prospective study was conducted on Whole blood donors (Voluntary/Replacement) to analyse the various causes of Deferral, over a period of one year, from November 2012 to October 2013, among different age groups of both the Sex at the Postgraduate Department of Transfusion Medicine, Government Medical College, Jammu, India. The data thus collected was calculated and statistically analysis was done with SPSS software.
Results: Out of 16,015 whole blood donors who were registered, 14,885 (92.9%) were eligible for donation and 1,130 (7.1%) donors were deferred. The deferral rate among male population (815/15,051) was 5.40% while in female population (315/964) was 32.7%. The most common cause of deferral in male donors was low haemoglobin (253, 31%) followed by medication (147, 18%), past blood donation (72, 8.8%), Hypertension in (64, 7.9%). The most common cause of deferral in female donors was low haemoglobin (206, 65.4%) followed by underweight (44, 14%), medication (20, 6.3%).
Conclusion: The donor deferrals can be reduced by providing information regarding eligibility criteria for donation and educating the donors regarding self deferral. This reduces the negative feeling about blood donations among blood donors that are deferred.

Keywords: Donor deferral, Blood donors, Voluntary, Replacement, Blood Donation, Hemoglobin.

INTRODUCTION

Donor Deferral is a painful and sad experience for voluntary blood donor as well as the transfusion centre and it necessitates additional efforts towards new recruitments. Moreover, deferring prospective donors often leaves them with negative feelings about themselves as well as the blood donation process. [1] Deferred donors do not contribute to the blood supply but could, in large numbers, prolong waiting times and deter repeated donation. [2] In addition, temporary deferral constitutes a negative donation experience, hindering the conversion of replacement donors into voluntary ones for

the future. [3,4] National AIDS Control Organization's (NACO) statistics show that the annual rate of blood donation in India is about 7.4 million units, against the requirement of 10 million units. [5] According to World Health Organization (WHO) figures, over 81 million units of blood are collected annually worldwide but only 39% are collected in developing countries which have 82% of the world's population. [6,7] A blood bank plays an important role in ensuring the supply of safe blood as and when required. While it is important to ensure that there is an adequate supply of blood, it is also essential that the blood collection process does not harm either the donor or the recipient. This is achieved by having donor deferral criteria [8] and stringent screening of collected blood for possible Transfusion Transmissible Infections (TTI's). [9] Pre-donation donor selection is done for the safety of the blood donor and the recipient. This study aims to analyse the donor deferral rate and its various causes in Voluntary and Replacement Blood Donors.

MATERIALS AND METHODS

A prospective study was conducted on Whole blood donors (Voluntary/Replacement) to analyse the various causes of Deferral, over a period of one year, from November 2012 to October 2013, among different age groups of both the Sex at the Postgraduate Department of Immuno-haematology and Blood Transfusion Medicine, Government Medical College, Jammu, India. The donor selection was done by pre-donation screening by various methods like donor questionnaire followed by physical examination and haemoglobin estimation. The deferred donor's data was then analysed. The donors who were fit according to the Directorate General of Health Services guidelines, Ministry of Health and Family Welfare (2003), [10] were allowed to donate blood. Deferred donors data was analysed with respect to age, sex, type of donor and causes for deferral which were also categorised into permanent and temporary causes based on the curability of the condition. The deferred donor's data thus collected was calculated and statistically analysis was done with SPSS software.

RESULTS

Out of 16015 whole blood donors who came were registered, 14885 (92.9%) were eligible for donation and 1130 (7.1%) whole blood donors were deferred. The deferred rate among male population (815/15051 cases, 5.40%) and female population (315/964 cases, 32.7%) were observed. Deferral rate among female population was 6 times higher than the male population [Table/Fig: 1].

[Table/Fig: 1] Distribution of Male and Female Whole Blood Donors

Donor Category	Gender		Total n (%)
	Male n (%)	Female n(%)	
Total Donor Selected	14236 (94.60%)	649 (67.30%)	14885 (92.9%)
Total Donor Deferred	815 (5.40 %)	315 (32.70%)	1130 (7.1%)
Total	**15051 (100%)**	**964 (100%)**	**16015 (100%)**

The deferred donors were divided according to the age group as shown in the [Table/Fig-2]. Deferral rate was highest among 18-29 years age group (549, 48.6%) followed by 30-41 years (392, 34.70%), 42-53 years (158, 14%) & 54-65 years (31, 2.70%). It is seen that most of the deferred donors belongs to younger age group. Out of 1130(7.1%) whole blood donors who were deferred, 300 (26.5%) were voluntary donors and 830 (73.5%) were replacement donors. Out of the total 1130 deferrals, 1018 (90.1%) cases were due to permanent causes and 112 (9.9%) were due to temporary causes [Table/Fig-2].

Out of 16015 donors who had come for blood donation, 1130 (7.1%) donors were deferred. The deferral rate among 18-29 age group (549/8425 cases, 6.52%), 30-41 age group (392/5754 cases, 6.81%), 42-53 years (158/1679 cases,

9.41%) and in age group of 54-65 years (31/157 cases, 19.74%) [Table/Fig: 3].

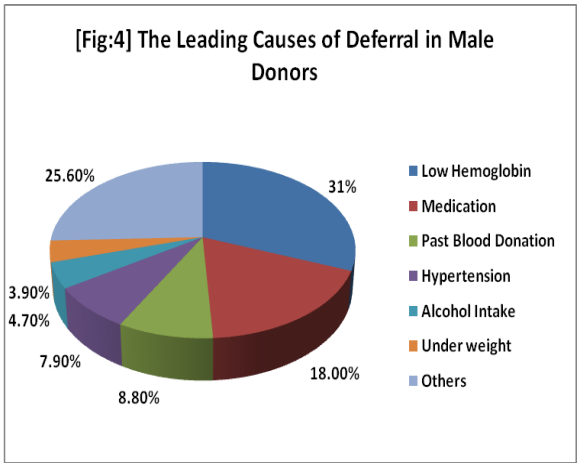
[Table/Fig: 2] Demographic profile of Deferred Whole blood Donors

Particulars		Male	Female	Total (%)
Age	18-29	374	175	549(48.60%)
	30-41	288	104	392(34.70%)
	42-53	128	30	158 (14%)
	54-65	25	6	31 (2.70%)
Type of Donation	Voluntary	112	288	300 (26.5%)
	Replacement	703	127	830 (73.5%)
Type of Deferral	Temporary	723	295	1018 (90.1%)
	Permanent	92	20	112 (9.9%)

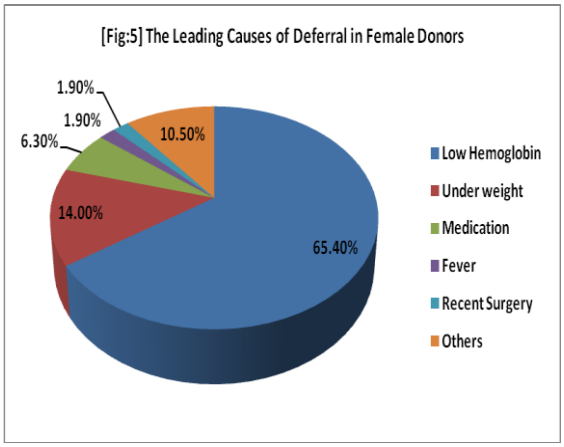
[Table/Fig: 3] Frequency of Deferred Donors among their respective age group

Age Group (years)	Total No. of Donors	No. of Deferred Donors	% Deferred
18-29	8425	549	6.52%
30-41	5754	392	6.81%
42-53	1679	158	9.41%
54-65	157	31	19.74%
Total	**16015**	**1130**	**7.1%**

The most common cause of deferral in male donors was low haemoglobin (253, 31%) followed by medication (147, 18%), past blood donation (72, 8.8%), Hypertension in (64, 7.9%), Alcohol intake (38, 4.7%) and under weight (32, 3.9%) and the other causes constitute about (209, 25.60%). [Fig: 4]



In case of female, the leading causes of deferral were low hemoglobin (65.4%), under weight (14%), medication (6.3%), fever (1.9%) and recent surgery (1.9%) and the other causes constitute about 10.5%.[Fig: 5]



[Table/Fig:6]Age and Sex Wise Distribution of Temporary Deferral among Deferred Voluntary Donors

Causes of Temporary Deferral	18-29 Yrs		30-41 Yrs		42-53 Yrs		54-65 Yrs		Total Cases		Grand Total (n)	%age
	M	F	M	F	M	F	M	F	M	F		
Low hemoglobin	11	64	4	27	1	10	-	1	16	102	118	43.70
Medication	10	2	19	15	4	-	-	-	33	17	50	18.52
Underweight	5	30	1	5	-	1	-	-	6	36	42	15.55
Jaundice	6	1	2	0	-	-	-	-	8	1	9	3.33
Past-blood donation	5	-	3	0	-	-	-	-	8	-	8	2.96
Recent Surgery	2	1	0	4	-	1	-	-	2	6	8	2.96
Fever	1	1	2	2	1	-	-	-	4	3	7	2.59
Typhoid	3	1	2	0	-	-	-	-	5	1	6	2.22
Dental Extraction	2	-	1	1	1	-	-	-	4	1	5	1.85
Skin Infections	1	0	2	-	-	-	-	-	3	-	3	1.11
Hypotension	1	1	-	1	-	-	-	-	1	2	3	1.11
Tatoo	2	-	-	-	-	-	-	-	2	-	2	0.74
Alcohol Intake	1	-	1	0	-	-	-	-	2	-	2	0.74
Ear Piercing	2	-	-	-	-	-	-	-	2	-	2	0.74
Pregnancy	-	2	-	-	-	-	-	-	-	2	2	0.74
Dog-bite	-	-	1	-	-	-	-	-	1	-	1	0.37
Blood Transfusion	-	1	-	-	-	-	-	-	-	1	1	0.37
Inaccessible vein	-	1	-	-	-	-	-	-	-	1	1	0.37
Total	**52**	**105**	**38**	**55**	**7**	**12**	**0**	**1**	**97**	**173**	**270**	**100**

[Table/Fig: 7] Age and Sex Wise Distribution of Permanent Deferral among Deferred Voluntary Donors

Causes of Permanent Deferral	18-29 Yrs		30-41 Yrs		42-53 Yrs		54-65 Yrs		Total Cases		Grand Total (n)	%age
	M	F	M	F	M	F	M	F	M	F		
Hypertension	-	-	5	4	2	2	1	1	8	7	15	50
Epilepsy	2	1	1	2	1	1	-	-	4	4	8	26.67
Diabetes	-	-	-	-	1	1	1	1	2	2	4	13.33
Asthma	-	-	1	1	-	-	-	-	1	1	2	6.67
Heart Disease	-	1	-	-	-	-	-	-	-	1	1	3.33
Total	**2**	**2**	**7**	**7**	**4**	**4**	**2**	**2**	**15**	**15**	**30**	**100**

[Table/Fig:8] Age and Sex Wise Distribution of Temporary Deferral among Deferred Replacement Donors

Causes of Temporary Deferral	18-29 Yrs		30-41 Yrs		42-53 Yrs		54-65 Yrs		Total Cases		Grand Total (n)	%age
	M	F	M	F	M	F	M	F	M	F		
Low hemoglobin	101	54	86	34	37	13	13	3	237	104	341	45.60
Medication	55	2	40	1	16	-	3	-	114	3	117	15.64
Past blood donation	34	-	23	-	6	-	1	-	64	-	64	8.56
Alcohol intake	15	-	13	-	7	-	1	-	36	-	36	4.81
Underweight	18	5	6	3	2	-	-	-	26	8	34	4.55
Jaundice	13	-	7	-	1	-	-	-	21	-	21	2.81
Typhoid	13	-	5	-	2	-	-	-	20	-	20	2.67
Dental Extraction	6	-	8	-	2	-	-	-	16	-	16	2.14
Skin infection	7	1	5	-	3	-	-	-	15	1	16	2.14
Tatoo	10	-	4	-	-	-	-	-	14	-	14	1.87
Tuberculosis	6	-	5	-	2	-	-	-	13	-	13	1.74
Dog-bite	7	1	3	-	1	-	-	-	11	1	12	1.60
Infected wound	7	-	4	-	1	-	-	-	12	-	12	1.60
Recent surgery	8	-	3	-	1	-	-	-	12	-	12	1.60
Fever	2	2	2	1	1	-	-	-	5	3	8	1.07
Ear piercing	6	-	-	-	-	-	-	-	6	-	6	0.80
Malaria	2	-	1	-	1	-	-	-	4	-	4	0.53
Pregnancy	-	2	-	-	-	-	-	-	-	2	2	0.27
Total	**310**	**67**	**215**	**39**	**83**	**13**	**18**	**3**	**626**	**122**	**748**	**100**

[Table/Fig:9] Age and Sex Wise Distribution of Permanent Deferral among Deferred Replacement Donors.

Causes of Permanent Deferral	18-29 Yrs		30-41 Yrs		42-53 Yrs		54-65 Yrs		Total Cases		Grand Total (n)	%age
	M	F	M	F	M	F	M	F	M	F		
Hypertension	6	-	20	1	27	1	3	0	56	2	58	70.73
Asthma	3	1	4	1	1	-	-	-	8	2	10	12.19
Diabetes	-	-	2	1	4	-	1	-	7	1	8	9.76
Epilepsy	1	-	2	-	1	-	-	-	4	-	4	4.88
Heart disease	-	-	-	-	1	-	1	-	2	-	2	2.44
Total	**10**	**1**	**28**	**3**	**34**	**1**	**5**	**0**	**77**	**5**	**82**	**100**

Leading causes of temporary deferral in voluntary donors were low hemoglobin (43.70%), Medication (18.52%) and Under Weight (15.5%). The other causes of temporary deferral and their proportion in voluntary donors who were deferred are shown in [Table/Fig: 6].

The leading causes of permanent deferral among deferred voluntary donors were hypertension (50%), epilepsy (26.67%), diabetes (13.3%), asthma (6.67%) and heart disease (3.33%). The age and sex wise distribution of permanent deferral among deferred voluntary donors is shown in [Table/Fig: 7].

The leading cause of temporary deferrals among deferred replacement donor were low hemoglobin (45.60%), medication (15.64%), past blood donation (8.56%), alcohol intake (4.81%) and under weight (4.55%). The other causes of temporary deferral among deferred replacement donors and their proportion is shown in [Table/Fig: 8]

The leading causes of permanent deferral among deferred replacement donors were hypertension (70.73%), asthma (12.19%), diabetes (9.76%), epilepsy (4.88%) and heart disease (2.44%). The age and sex wise distribution of permanent deferrals among deferred replacement donors and their proportion is shown in [Table/Fig: 9]

DISCUSSION

Safe donor selection is the first step towards safe transfusion services. National and international efforts are on to ensure

safe blood supply through screening, education and strict criteria laid down by the Directorate General of Health Sciences, Ministry of Health and Family Welfare (2003) and Eligibility criteria for blood donation by WHO Guidelines on Assessing Donor Suitability for Blood Donation. [10,6]

Out of the total donors who were willing for blood donation, 1130 (7.1%) donors were deferred. Similar study by Madhuri S Kate et al. (2013) which was done in Mumbai reported deferral rate of 7.55%. [11] Similar deferral rates were observed by Sunder P et al. (6%), Unikrishanan B et al. (5.2%), Rabeya et al. (5.6%) & Bahadur S et al. (9%). [12-14,9] Higher deferral rates were were observed by Agnihotri N (11.6%), Lim JC et al. (14.4%), Choudhary R K et al. (16.4%), Layla AM Bashawri (19.2%) which could be due to different donor selection criteria. [15-18]

In the present study the overall deferral rate was 7.1% and the overall number of deferral was higher in males (72.12%) compared to females (27.88%). This is similar to that observed by Nagarekha Kulkarni (2012) where deferred males and females were 65.33% and 34.67% respectively. [19] Madhuri S Kate et al. (2013) also observed the similar findings in males (62%) and females (38%). [11] Bahadur S et al. (2009) observed high deferral in males (90.8%) and low deferral in females (9.2%). [9] In our study deferral rate was highest among 18-29 years age group (549, 48.60%) followed by 30-41 years (392, 34.70%), 42-53 years (158, 14%) and 54-65 years (31, 2.70%). Most of these deferred donors (83.30%) were in the age group of 18-40 years which is comparable to the studies of Bahadur S et al. (89.7%), Girish CJ et al. (84.98%), Unnikrishnan B et al. (80.12%), Nagarekha Kulkarni (74.33%) [9,20,13,19] This highlights the fact that a sizeable proportion of youth in this part of the world are malnourished, reflecting the impact of low socio economic status on health of Indian youth. Donors above 65 years are not allowed to donate blood. Even otherwise it is rare to have donor voluntarily coming to donate blood in our region.

In our study there was significant increase in the deferral percentage as the age increases. In a similar study, Naveen Agnihotri (2010) from Pune reported that the deferral percentage increases as the age of the donors increases. [15]

The deferral rate among male population (815/15051 cases, 5.40%) and female population (315/964 cases, 32.70%) were observed. Deferral rate in our study among female population was 6 times higher than the male population. Our study is comparable to the study conducted by Madhuri S Kate et al. (2013) who observed deferral rate about 6 times more for females (62/187 cases, 33.15%) as compared to males (101/1985, 5.09%). [11] Arun R et al. (2012) also observed higher deferral rate among female donors (33.61%) than male donors (7.11%). [21] Suhailur Rehman et al. (2012) observed deferral rate of 11.98% and 20.41% among male & female donors respectively. [22] The reason of high deferral rate among female donors in above studies may be due to the wide prevalence of anaemia in female donors.

In our study, out of 1130 donors who were deferred, 300 (26.5%) were voluntary donors and 830 (73.5%) were replacement donors. Nagarekha Kulkarni (2012) observed high deferral rate of 79% in voluntary donors. [19] The reason for high deferral rate in replacement donors in our study may be due to more number of replacement donors than voluntary donors.

In our study, the causes of deferral were broadly classified into temporary and permanent. There was more number of temporary deferrals constituting 1018 (90.1%) donors than permanent deferrals which makes 112(9.9%) donors. Bahadur S et al. (2009) reported 91% temporary deferrals and 9% permanent deferrals which is similar to the present study. [9]

Sangita D Shah et al. (2013) observed 87.55% temporary deferrals and 12.45% permanent deferrals which is almost similar to the present study. [23] Custer et al. (2004), Madhuri S Kate (2013, Nagarekha Kulkarni (2012), Suhailur Rehman et al. (2012) observed high number of permanent deferrals. [24, 11, 19,22] The Comparison in rate of Temporary and Permanent deferrals is shown in [Table/Fig: 10]

[Table/Fig: 10] Comparison in rate of temporary and permanent deferrals in different studies

Study	Temporary Deferrals (%)	Permanent Deferrals (%)
Custer et al. (2004) [24]	68.5%	31.5%
Bahadur S et al. (2009) [9]	91%	9%
Nagarekha Kulkarni (2012) [19]	68%	32%
Shahtaz Khan et al. (2012) [25]	81.26%	18.73%
Suhailur Rehman et al.(2012) [22]	63.7%	36.3%
Agravat Amit H et al. (2013) [26]	83.93%	16.07%
Madhuri S Kate (2013) [11]	79.8%	20.2%
Sangita D Shah et al. (2013) [23]	87.55%	12.45%
Present Study	90.1%	9.9%

Jed Gorlin (2008) reported that temporary deferrals play greatest havoc with donors who represent the future voluntary blood donations. [27] Pilivian et al. (1987) reported first time donors receiving a temporary deferral were 25% less likely to return for a donation whereas repeat donors are 15% less likely to return for donation within 6 months. [28] In our study the most common cause of deferral in male donors was low haemoglobin in 253 (31%) donors followed by medication in 147(18%) donors, past blood donation in 72 (8.8%) donors, Hypertension in 64 (7.9%) donors, alcohol intake in 38(4.7%) donors, underweight in 32(3.9%) donors and the other causes which comprised 209 (25.6%) donors. Bahadur S et al. (2009) observed the leading cause of deferral in male was low haemoglobin (28.7%) followed by weight (27.8%), jaundice (8.9%), alcohol (7.7%) and TB (4%). [9] In a similar study, Arun R et al. (2012) observed that the leading cause of deferral in males was high blood pressure (35.2%) followed by low haemoglobin (23.36%), medication (20.8%), RTI (9.12%) and low weight (4%). [21] Charles at al. (2010) reported low haemoglobin (22.7%) followed by high blood pressure (17.5%) was the main causes of deferral in men. [29] Rabeya et al. (2008) observed high blood pressure (45%) followed by medical illness (21.4%) were the main reasons of deferral among men. [14]

In our study, the most common cause of deferral in female donors was low haemoglobin in 206(65.4%) donors followed by underweight in 44(14%) donors, medication in 20(6.3%) donors. Hypertension in 9 (2.9%) donors, fever and recent surgery in 6(1.9%) donors each and other causes which comprises 24(7.6%) donors. Bahadur S et al. (2009) in a similar study observed that the most common cause of deferral in female donors was low haemoglobin (74.1%) followed by weigh (14.4%), lactation (6.5%), menstruation (1.4%) and fever, cough (1.4%). [9] Arun R et al. (2012) observed that the leading cause of deferral in females was low haemoglobin 52.61%) followed by medication (15.58%), low weight (12.97%), hypertension (7.02%) and RTI (5.58%). [21]

In our study the most common cause of permanent deferral was hypertension (65.2%) and it constitute a proportion of about 6.46% out of total deferral. Nagarekha Kulkarni (2012) in a similar study found hypertension in 48.96% donors as the most common cause of permanent deferral. [19] Madhuri S Kate et al. (2013) observed hypertension (9.20%) as second most common cause of deferral. [11] Arun R et al. (2012) observed high blood pressure in 259 (21.94%) donors as the second most common cause of deferral. [21] The reason of hypertension being the major cause of deferral may be fear of phlebotomy, fear of sight of blood etc, or white coat hypertension - a common phenomenon seen in people almost as soon as they enter hospital. Moreover, hypertension being a modern epidemic often goes undiagnosed and is an incidental finding in most cases as reported by Trembath CR et al. (1991). [30]

Thus, analysing all the observations in our study, it can be concluded that although donor rejection rates are similar to different population, the reasons for deferral differ, reflecting disparities in socio economic status. Analysis of rejection patterns may help medical personal to be more focussed in donor screening. This will not only help in improving donor and recipient safety but also in maintaining a healthy donor pool in the long run, provided the potential donors are appropriately counselled and managed to improve the efficiency of the donor programme. Temporary donor deferrals need to be actively and aggressively managed so as not to lead to a diminished supply of future donors. Thus, it would make the data generated by the study, to be useful for health planners, while making efforts to face the future health challenges in the region.

CONCLUSION

Analysis of rejection patterns may help medical personal to be more focussed in donor screening. This will not only help in improving donor and recipient safety but also in maintaining a healthy donor pool in the long run, provided the potential donors are appropriately counselled and managed to improve the efficiency of the donor programme. Temporary donor deferrals need to be actively and aggressively managed so as not to lead to a diminished supply of future donors. Thus, it would make the data generated by the study, to be useful for health planners, while making efforts to face the future health challenges in the region.

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