Research Article

Analysis of predonation blood donor deferral characteristics in Ajmer (Rajasthan) region

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Abstract

Background: In today's modern health-care practice, transfusion medicine is an important component of it. Safe blood supply and transfusion is one of the major issues in transfusion medicine. Potential blood donors may not be able to donate blood for several reasons either related to donor's own health or risk to the recipient. To ensure safe transfusion practice, it is paramount that all blood donors are in good health. This leads to shortage of blood donors and necessitates understanding and analyzing the cause of deferral in potential blood donors.

Objective: To evaluate the rate and major reasons of blood donor deferrals.

Materials and Methods: A retroprospective study was done to analyze the various causes of blood donor deferrals over a period of 2 years from January 2013 to December 2014. Donor eligibility criteria were followed according to the National guidelines for blood donation. Donors deferred were analyzed according to their age, sex, type of donor, type of deferral, and reasons for deferral.

Result: Of 41,412 blood donors who came to donate blood, 97.44% were eligible for donation, and 2.56% blood donors were deferred. The deferral rate among male population (719/39,712 cases, 1.82%) and female population (344/1,700 cases, 20.24%) were observed. Temporary deferral was significantly more common than the permanent deferral (87.48% vs 12.52%). Leading causes of deferral were anemia (398 cases, 37.44%), alcohol intake (147 cases, 13.82%), underweight (125 cases, 11.76%), and hypertension (94 cases, 8.84%). Anemia was the most common cause of temporary deferral, whereas hypertension was the primary reason of permanent deferral. The leading causes of male donor deferral were anemia and alcohol intake, whereas among female donors it was anemia and underweight. Maximum deferrals were seen in the age group of 18–30 years (547/1,063 cases, 51.45%).

Conclusion: Studying the profile of blood donors will help to identify selection of the donor population which could be targeted to increase the pool of voluntary blood donors and also to guide and provide the essential database for the policy design and program implementation.

KEY WORDS: Blood donors, anemia, hypertension

Introduction

Blood transfusion service is the vital part of modern health-care system without which efficient medical care is not possible. The main goal of blood transfusion services globally is to ensure the availability of safe and adequate supply of blood and blood products. Availability of safe blood and blood products is a critical component in improving health care.[1]

It is reported that donation by 1% of the population is usually the minimum requirement to meet a country's most basic need for blood. The needs are higher in countries with more advanced health-care systems.[2]

The National AIDS Control Organization (NACO) statistics reveal that the annual rate of blood donation in India is about 7.4 million units against the need of 10 million units per year.[3]

According to the WHO, 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.[4]

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The paucity of healthy, safe blood donors has always been a serious problem for the blood banks worldwide. While it is important to ensure that there is an adequate supply of blood, it is also essential that the blood collection and transfusion process does not harm either the donor or the recipient.

To protect donor and recipient, stringent blood screening criteria are necessary.[5]

Blood safety is ensured through selection of appropriate donor population, screening of donors, testing of donated blood units, and efficient blood transfusion practices as per the Drugs and Cosmetic Act 1940.[6]

Blood donor deferral is a painful and sad experience for the blood donors and for the center screening the blood donors. Deferral leads to loss of precious blood donors and blood units available for transfusion purposes.

These deferrals often leave the donor with negative feeling about themselves and blood donation process also.[7] In addition, these donors are less likely to return for blood donation in future.

Voluntary nonremunerated blood donors are the foundation of a safe, sustainable blood supply. A transfusion service should therefore rely as far as possible on voluntary repeat donors in accordance with the recommendations by the WHO.[8]

Knowledge of rate and causes of donor deferral can guide the recruitment strategy.

The aim of this study is to find out the major reasons of deferral in our community, to target the safe blood donor population to ensure the safest blood possible, and to correlate with other possible parameters which may affect the blood donation.

A deferral study in blood donor candidates may shed light on the health status of the general population.

Materials and Methods

This retroprospective study was conducted over a period of 2 years from January 2013 to December 2014 in the Zonal and Janana Blood Banks, JLN Medical College, Ajmer (Rajasthan), India, done on the donors, both voluntary and replacement who came for the blood donation.

Each donor was selected by the blood transfusion medical officer based on the detailed medical history and brief physical examination of donor with regard to hemoglobin, blood pressure (BP), temperature and pulse regularity, and rate.

Criteria laid down by the Directorate General Health Services and Drug Controller of India were strictly followed for donor selection and deferral.

Hemoglobin level not less than 12.5 g/dL, weight not less than 45 kg, age limit between 18 and 60 years, systolic blood pressure between 110 and 140 mm of Hg, diastolic blood pressure between 80 and 90 mm of Hg, and temperature not more than 37°C were the preset standards used for donor selection.

Hemoglobin estimation was done by using $CuSO_4$ specific gravity method and Hemocue method.

The data taken from the donor register and blood donor questionnaire form were compiled and analyzed. Deferred donor data were analyzed with respect to age, gender, type of donor, cause of deferral, and duration of deferral.

Statistical analysis was done using SPSS software, version 22 and Microsoft Excel. Descriptive and inferential statistics were used as appropriate. Significance level was set at 5% ($p < 0.05$).

Result

Of 41,412 whole blood donors, 34,367 were voluntary donors and 6,775 replacement donors (83.64% vs. 16.36%). There were 39,712 male and 1,700 female donors (95.89% vs. 4.11%). Voluntary and male donors outnumbered the replacement and female donors significantly [Table 1].

A total of 1,063 donors were deferred from giving blood. There were 719 male and 344 female deferrals. The deferral rate was 2.56% with male deferral rate of total registration being 1.73% and female deferral rate of 0.83%. The prevalence of deferral among male donor population was 1.82% when compared with 20.24% among female donor population. Males outnumbered the female deferral in frequency, but the prevalence of deferral was significantly higher among females than in male subjects [Table 2].

Table 1: Demographic profile of whole blood donors registering for blood donation

Type of donor	No. of donors	% of total registration	Gender	No. of donors	% of total registration
Voluntary	34367	83.64%	Male	39712	95.89%
Replacement	6775	16.36%	Female	1700	4.11%
Total	41412	100%	Total	41412	100%

Table 2: Distribution of donors deferred according to the gender

Gender	No. of registration	No. of deferral	% of deferral of total registration
Male	39712	719	1.73%
Female	1700	344	0.83%
Total	41412	1063	2.56%

Chi square value- 2217.76, p-value- < 0.01 (Significant)

Among 1,063 deferred donors, the frequency of temporary deferral (*n* = 930, 87.48%) was higher when compared with permanent deferral (*n* = 133, 12.52%). The prevalence of temporary deferral was 2.24% when compared with 0.32% that of permanent deferral [Table 3].

Frequency of male donor deferral was higher than female donor deferral among voluntary donors and temporary deferral when compared with replacement donor and permanent deferral [Table 4].

Depending upon the occupation, maximum deferral donor were students (*n* = 307, 28.9%), followed by housewife (*n* = 168, 15.8%) and drivers (*n* = 141, 13.2%) [Table 5].

The leading causes of donor deferral among male subjects were anemia (*n* = 168, 23.36%) and alcohol intake (*n* = 147, 20.45%). The leading causes of donor deferral among female subjects were anemia (*n* = 230, 66.86%) and underweight (*n* = 29, 8.43%) [Table 6].

The deferred 1,063 cases were categorized into temporary and permanent deferrals. Among 930 temporary deferred cases, anemia was the leading cause of deferral (42.85%), followed by alcohol intake (15.8%) and underweight (13.44%) as shown in Table 7. Among 133 permanent deferrals, the leading cause was hypertension (70.7%), followed by diabetes mellitus (6.75%) and thyroid disorders (6.01%) as shown in Table 8.

Among voluntary male donors, anemia (*n* = 105, 24.02%) and alcohol intake (*n* = 84, 19.22%) were the major reasons of deferral. In female voluntary donors, it was anemia (*n* = 201, 67.22%), followed by underweight (*n* = 24, 8.02%) as shown in Table 9.

Among replacement male donors, alcohol intake (*n* = 63, 22.66%) and anemia (*n* = 62, 22.30%) were the major reasons of deferral. In female replacement donors, it was anemia (*n* = 30, 61.22%), followed by underweight (*n* = 5, 10.20%) as shown in Table 10.

The deferral was the highest among 18–30 years age group (51.45%), followed by 31–40 years (23.9%) as shown in Table 11.

The highest number of deferral both in males and female subjects were seen in the age group of 18–30 years as shown in Table 12.

Table 13 shows that the number of male deferral owing to abnormal blood pressure was almost seven times that of female deferral and the number of female deferral owing to anemia was almost 1.5 times that of number of male deferrals.

Table 3: Frequency of temporary and permanent deferrals of blood donors

	No. of deferral	% of total deferral	% deferral of total registration
Temporary	930	87.48%	2.24%
Permanent	133	12.52%	0.32%
Total	1063	100%	2.56%

Table 4: Distribution of deferred blood donors

	Voluntary donor	Replacement donor	Temporary deferral	Permanent deferral
Male	439	280	604	115
Female	297	47	326	18
Total	736	327	930	133

For voluntary and replacement donor-Chi square value -69.81, p-value -< 0.01 (Significant)
For temporary and permanent deferral-Chi square value -24.61, p-value -< 0.01 (Significant)

Table 5: Occupation status of deferred blood donors

Occupation	No. of deferrals	% of total deferral
Student	307	28.9%
Housewife	168	15.8%
Driver	141	13.2%
Businessmen	134	12.6%
Worker	106	10%
Farmer	97	9.1%
Services	37	3.5%
Others	54	5.1%
Unemployed	19	1.8%
Total	1063	100%

Table 6: Five leading causes of deferral in male & female blood donors

Males (n=719 deferrals)			Females (n=344 deferrals)		
Causes	**No. of deferral**	**% of male deferral**	**Causes**	**No. of deferral**	**% of female deferral**
Anaemia	168	23.36%	**Anaemia**	230	66.86%
Alcohol intake	147	20.45%	**Underweight**	29	8.43%
Underweight	96	13.35%	**Age < 18 years**	12	3.49%
Hypertension	83	11.54%	**Menstruation**	12	3.49%
Age <18 years	28	3.90%	**Hypertension**	11	3.19%
Total	522	82.6%	**Total**	294	85.46%

Table 7(A): Causes of temporary deferral with their relative proportion

Causes	No. of male deferrals	No. of female deferrals	Total no. of deferrals	Temporary deferral %
Anaemia	168	230	398	42.80
Alcohol	147	00	147	15.80
Underweight	96	29	125	13.44
Underage	28	12	40	4.30
Antibiotics	29	07	36	3.87
Last donation <3 months	31	03	34	3.65
Medications	18	08	26	2.80
Menses	00	12	12	1.29
Allergy	11	01	12	1.29
Hypotension	08	03	11	1.18
Fever	08	02	10	1.09
Surgery	05	05	10	1.09
Ear / Nose piercing	04	05	09	0.97
Skin diseases	08	00	08	0.86
Tattooing	07	00	07	0.75
Jaundice	06	01	07	0.75
\\iberculosis	04	00	04	0.43
TT injection	02	02	04	0.43
Dental extraction	02	02	04	0.43
Donor refused	04	00	04	0.43
Blood transfusion <6 months	03	00	03	0.32
Thin vein	03	00	03	0.32
Typhoid	02	00	02	0.21
Lactation	00	02	02	0.21
Pregnancy/Deliver	00	02	02	0.21
Malaria	01	00	01	0.11
Rabies vaccine	01	00	01	0.11
Not proper rest	01	00	01	0.11
Professional donor	01	00	01	0.11
Fainting	01	00	01	0.11
Fasting	01	00	01	0.11
Diarrhoea	01	00	01	0.11
Chickengunva	01	00	01	0.11
Chest discomfort	01	00	01	0.11
Accident	01	00	01	0.11
Total	604	326	930	100

p- value < 0.01 (Significant), r = 0.7107

Table 7(B): Causes of permanent deferral with their relative proportion

Causes	No. of male deferrals	No. of female deferrals	Total no. of deferrals	Permanent deferrals %
Hypertension	83	11	94	70.70
Diabetes	07	02	09	6.75
Thyroid disorders	05	03	08	6.01
Epilepsy	03	00	03	2.26
Asthma	02	00	02	1.50
Hepatitis B	01	01	02	1.50
HIV	02	00	02	1.50
Cardiac illness	02	00	02	1.50
Piles	02	00	02	1.50
Age > 60 years	01	01	02	1.50
Hepatitis C	01	00	01	0.75
Myocardial infarction	01	00	01	0.75
Brain surgery	01	00	01	0.75
Brain tumour	01	00	01	0.75
Malignancy	01	00	01	0.75
Migraine	01	00	01	0.75
Bleeding disorders	01	00	01	0.75
Total	115	18	133	100

p- value < 0.01 (Significant), r = 0.9642

Table 8: Five leading causes of deferral in voluntary donors

Males (n = 437 deferrals)			Females (n = 299 deferrals)			Total (n = 736 deferrals)		
Causes	**No. of deferral**	**% of male voluntary deferral**	**Causes**	**No. of deferral**	**% of Female voluntary deferral**	**Causes**	**No. of deferral**	**% of female voluntary deferral**
Anaemia	105	24.02%	Anaemia	201	67.22%	Anaemia	306	41.6%
Alcohol	84	19.22%	Underweight	24	8.02%	Underweight	86	11.7%
Underweight	62	14.18%	Underage	12	4.01%	Alcohol	84	11.4%
Hypertension	55	12.58%	Menstruation	11	3.68%	Hypertension	65	8.8%
Underage	23	5.26%	Medications	08	2.68%	Underage	35	4.8%
Total	329	75.26%	Total	256	85.61%	Total	576	78.3%

p- value < 0.01 (Significant), r = 0.9642

Table 9: Five leading causes of deferral among replacement donors

Males (n = 278 deferrals)			Females (n = 49 deferrals)			Total (n=327 deferrals)		
Causes	**No. of deferral**	**% of male replacement deferral**	**Causes**	**No. of deferral**	**% of female replacement deferral**	**Causes**	**No. of deferral**	**%of total replacement deferral**
Alcohol	63	22.66%	Anaemia	30	61.22%	Anaemia	92	28.1%
Anaemia	62	22.30%	Underweight	5	10.20%	Alcohol	63	19.3%
Underweight	34	12.23%	Last donation < 3 months	3	6.12%	Underweight	39	11.9%
Hypertension	28	10.07%	Medications	2	4.08%	Hypertension	29	8.9%
Last donation < 3 months	15	5.40%	Hypertension	1	2.04%	Last donation < 3 months	18	5.6%
Total	202	72.66%	Total	41	83.66%	Total	241	73.8%

Table 10: Distribution of temporary and permanent deferrals among different age groups

Age groups	Temporary deferrals	Permanent deferrals	Total	%
< 18 years	40	00	40	3.76%
18-30 years	525	22	547	51.45%
31-40 years	211	43	254	23.90%
41-50 years	122	43	165	15.52%
51-60 years	27	23	50	4.71%
> 60 years	05	02	07	0.66%
Total	930	133	1063	100%

Table 11: Distribution of deferred male and female donors among different age groups

Age groups	Male deferrals	%	Female deferrals	%
< 18 years	28	3.9%	12	3.49%
18-30 years	376	52.3%	171	49.71%
31-40 years	166	23.09%	88	25.58%
41-50 years	110	15.29%	55	15.99%
51-60 years	36	5.0%	14	4.07%
> 60 years	03	0.42%	04	1.15%
Total	719	100%	344	100%

Table 12: Blood pressure and haemoglobin level distribution among blood donors

	Males (n = 39712)	Females (n = 1700)	Total (n = 41412)
Abnormal BP	91 (0.23%)	14 (0.83%)	105 (0.25%)
Normal BP	39621 (99.77%)	1686 (99.17%)	41307 (99.75%)
Hb < 12.5 g/dl	168 (0.43%)	230(13.53%)	398 (0.97%)
lib > 12.5 g/dl	39544 (99.57%)	1470 (86.47%)	41014 (99.03%)

For BP distribution- Chi square value- 28.8, p-value- < 0.01 (Significant)
For haemoglobin distribution- Chi square value- 2942.02, p-value- < 0.01 (Significant)

Table 13: Age group wise distribution of anaemic donors

Age groups	No. of males (n = 168)	% of male anaemic donors	% of all anaemic donors	No. of females (n = 230)	% of female anaemic donors	% of all anaemic donors
18-30 years	106	63.10%	26.63%	122	53.04%	30.65%
31-40 years	37	22.02%	9.3%	63	27.40%	15.83%
41-50 years	16	9.52%	4.02%	34	14.78%	8.54%
51-60 years	09	5.36%	2.26%	11	4.78%	2.77%
Total	168	100%	42.21%	230	100%	57.79%

Table 14 shows that maximum deferral owing to low hemoglobin both in males and females were seen in the age group of 18–30 years, followed by 31–40 years age group.

Discussion

Donor selection has vital importance in blood banking and transfusion medicine. The aim of our study was to device a protocol that could prevent the loss of blood donors and donations to be safe for the donors and recipients.

In our study, most of the donors were men (95.89%) when compared with women (4.11%). This finding was similar to various other studies. Birjandi[9] reported 95.6% male and 4.4% female donors. Unnikrishnan et al.[10] reported 95.13% male and 4.8% female donors. Female gender contributing very less to the donor pool can be attributed to ignorance,

fear, lack of motivation and awareness, sociocultural factors, and lesser opportunities among women for blood donation.

Voluntary donation was significantly higher than the replacement donation (83.64% vs. 16.36%). Kulkarni[11] reported voluntary donation of 83%, whereas Kate et al.[12] reported voluntary donation of 87.26%. Thus, our finding was similar to other studies. Large number of voluntary donation was possible owing to regular blood donation camps, donor sensitization, and awareness campaign.

The deferral rate in our study was 2.56%. Rathod et al.[13] reported deferral rate of 3.55% and Agrawat et al.[14] reported 3.72% deferral rate in their studies. Few studies like that of Agnihotri[5] and Gajjar et al.[15] reported higher deferral rates of 11.6% and 11.16%, respectively. Variation in the deferral rate can be attributed to multiple factors such as type of donor, variation in donor selection criteria, and high risk sexual behavior.

Our study showed that women donors had higher deferral rate (20.24%) when compared with men (1.82%), which might be owing to higher prevalence of anemia and low body weight in female subjects. Sundar et al.[16] also reported higher deferral rate in women (19.85%) than in men (4.06%) in their study. Similar finding was reported by Patil et al.[17] (17.88% vs. 2.4%).

Temporary deferrals were significantly more than the permanent deferrals (87.48% vs. 12.52%) signifying that most of the deferred donors can be recruited back to the donor pool if they are properly counseled and managed regarding their cause of deferral. This finding was similar to those mentioned in literatures as by Shah et al.[18] (87.55% vs. 12.45%) and Sundar et al.[16] (84% vs. 16%).

The number of deferred males was higher than the females because most of the donor pool was formed by the male subjects. Girish et al.[19] and Kulkarni[11] also stated similar findings in their respective studies.

On the basis of occupation status, maximum deferrals were seen in students (28.9%). Patil[17] and Kulkarni[11] also suggested maximum deferrals in students. It is a worrisome fact that a large number of students were rejected as these young adults are the main pillar of regular voluntary donation. So, still there is a need of health education among them.

The leading cause of deferral among males and female subjects was anemia, similar to that reported by Awasthi et al.[20] and Rathod.[13]

The most common reasons for temporary deferral were anemia (42.8%), followed by alcohol intake (15.8%) and underweight (13.44%). The primary cause of permanent deferral was hypertension (70.7%). Shah et al.[18] and Bahadur et al.[21] also reported anemia and hypertension as the leading cause of temporary and permanent deferral, respectively, in their studies.

Comparison between various studies showed that there were different sets of leading causes of deferral in various categories such as temporary and permanent deferral, male and female gender depending on the type of donor population, donor selection criteria sociocultural practices, and endemicity of infections.

The high prevalence of anemia reflects light on poor nutritional health status. Higher prevalence of anemia in female subjects can be explained by the fact that this group of population is more prone to depleted iron store because of poor nutrition, tropical diseases, and menstrual blood loss.

Low weight was also an important reason of deferral which again reflects poor nutritional status of the population. Because both anemia and low weight are curable, a large number of temporary deferred donors can be recruited back into the donor pool on proper management.

The probable reasons for high BP can be sight of blood, first-time donation, fear of phlebotomy, and white coat hypertension. There were few donors who were diagnosed with high BP for the first time while majority of them being patient of uncontrolled hypertension. Owing to ignorance among people, hypertension often goes undiagnosed and usually is incidental finding. This signifies hypertension as the common modern day epidemic in health sector. Such donors should be counseled and guided to change their lifestyle and to further take the treatment from a physician.

Among the replacement donors, last donation < 3 months was one of the major reasons of deferral underlying the fact that they were forced to donate the blood by the situation rather than their own willingness for the same. These further strengthen our aim of absolute voluntary donation, as the quality of blood if had been donated by these short interdonation replacement donors might not have been up to the standard.

On the basis of age groups, the maximum deferral in various categories such as temporary–permanent deferral, male–female donors were seen in 18–30 years, followed by 31–40 years, 41–50 years, and 5–60 years. Similar findings were reported by different authors such as Shah et al.,[18] Girish et al.,[19] Rathod et al.,[13] and Gajjar et al.[15]

It is apparent from these findings that sizeable proportion of youth in India is malnourished reflecting the impact of low socioeconomic status on the health. There is a need to address the cause of deferral among them as they are the ones who are going to be prospective regular blood donors.

Conclusion

Our study showed that although donor deferral rate were very much similar in different population, the reasons for deferral differ, reflecting difference in socioeconomic status and environment. In our study, the deferral rate was 2.56%, and most of the deferred donors were young adults with majority of them being the students deferred because of anemia and underweight and among older people because of hypertension. All the potential donors deferred should be informed at the time of deferral about the cause and duration of deferral so that they can be recruited back to donor pool on correction of the cause of deferral at appropriate duration. It is important to provide donors with a clear message on their deferral status. Increasing public education on common causes of donor deferral may also lower the deferral rate by allowing the prospective donors to “prescreen” themselves. So, to conclude, it

is important to determine the rate and causes of donor deferral for the safety of blood transfusion and to guide the recruitment efforts to prevent the loss of precious blood.

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