

Pre-donation Deferral Pattern of Allogeneic Blood Donors: An Analysis from a Developing Country

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ABSTRACT

Background: Pre-donation donor screening is a crucial step in ensuring the safety of both blood donors and recipients. Donors who do not meet predetermined criteria are temporarily or permanently deferred.

Aim: To assess the patterns and prevalence of deferrals at our institution.

Study design: Prospective study

Place and duration of study: Karachi Tertiary Care Hospital, Karachi from 1st January 2014 to 31st December 2015.

Methodology: Thirty six thousand, nine hundred and fifty four potential donors presented themselves, 33853 were selected and 3101 were excluded. Blood donors' demographic information was stored in the blood bank's database, and secondary measures such as the type of deferral (permanent/temporary) and reasons for deferral (donor or patient safety) were evaluated.

Results: The majority 2663(7.20%) of donors were deferred due to complete blood count, followed by medical history 264(0.71%) and examination findings 174(0.47%). The majority of donors (96%) were temporarily deferred, while only 3.9% were permanently deferred. Low haemoglobin counts were the most frequent cause of treatment delays (78.8%), followed by hypertension (3.64%) and a history of medication usage (1.32%). Donor safety accounted for the majority of donor rejections (91.5%), while recipient safety accounted for 8.41%.

Conclusion: The majority of donors were deferred due to abnormality in the profile of blood count mainly low hemoglobin level. The low hemoglobin counts were the most frequent cause of treatment delays, followed by hypertension and a history of medication usage. Only small numbers of donors were permanently deferred.

Keywords: Blood donor, Deferral, Permanent, Temporary

INTRODUCTION

Due to the prevalence of obstetric complications, traumatic injuries, nutritional anaemia, and infectious diseases, the demand for blood transfusions is high¹. To meet transfusion needs, the WHO recommended a collection rate of 10 to 20 blood units/1000 population². In developed nations, the average donation rate is 38.1 donations per 1000 people, while in developing nations, the average donation rate is 2.3 units per 1000 inhabitants³. In Pakistan, we frequently experience blood shortages due to a lack of awareness and unmotivated public support; consequently, we rely primarily on family donors⁴.

Due to donor deferral, situations become more complicated when there is a severe shortage of blood. As donor deferral negatively impacts donor retention and revisiting, it must be adhered to in order to safeguard both the donor and the potential recipient.⁵ Donor deferral is initiated either by the blood bank centre based on information provided by potential donors, or by the donor themselves via self exclusion deferral.⁶ The majority of potential donors are eligible for selection as safe blood donors, while a minority are rejected based on their medical history, physical examination, or haemoglobin measurement. Various countries have reported donor deferral rates ranging between 1.4% and 25%⁷. Knowledge of donor deferral are frequently lacking in resource-strapped developing nations, despite being well-described in high-middle income developed nations. In Northern Pakistan, it was revealed that varying reasons for donors' deferrals, highlighting the diverse demographic profile of our nation^{8,9}.

The primary purpose of this study was to identify the underlying causes of donor deferral and to analyse the incidence and pattern of donor deferral among blood donors in southern Pakistan and secondary purpose was to apply this knowledge to improve donor recruitment.

MATERIALS AND METHODS

The prospective study was conducted after IRB permission at the regional Blood Transfusion Centre, Karachi's Liaquat National Hospital and Medical College from 1st January 2014 to 31st December 2015. The demographic information includes name, age, sex, contact number, voluntary/replacement donors and cause of deferral were recorded. Each donor was elected by a donor attendant based on meticulous medical history and brief physical examination. An interval of 12 weeks should be elapsed from the last blood donation. Age (18 years), weight (50kg), sufficient venous access, pulse rate (50-100/min), acceptable blood pressure, haemoglobin level (12.5g/dl) and hematocrit value (PCV) of 38% were taken into consideration while choosing donors. To collect venous blood samples, all donors received 1-mL K3-EDTA anticoagulant vacuette tubes (Griener Bio-one). The automated haematology analyzer Nihon Kohden MEK-6410K was used to examine full blood counts. Concurrently, the necessary controls were run to verify the outcomes.

Donors who exhibited high-risk behaviour, male homosexuality, non-marital sexual contact, a history of jaundice, tattoo piercing, a recent blood transfusion within the past year, or who are drug abusers were prohibited from donating. Donors were also disqualified if their haemoglobin is 12.5 gm/dl or >18gm/dl, if their total leukocytic count is 14x10⁹/l, or if their platelet count is 100x10⁹/l. The information of the pre-donation screening, the database was updated with the acceptance or deferral of donors and the reasons for deferral. Donors who were deferred were divided into two categories based on temporary and permanent rejection, as well as "blood donor safety" and "blood recipient safety." Self-confidential donor exclusion is not practiced in our setting due to low literacy rates and a preponderance of replacement donors who may conceal the truth due to intense family pressure to donate. All potential blood donors gave their written consent after being fully informed. The data was entered and analysed through SPSS-22.

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RESULTS

Among 36,954 potential blood donors registered with our blood bank, 264 (0.71%) donors were rejected based on their medical history while 174 (0.47%) donors were rejected due to physical examination findings. Remaining 2,663 (7.20%) donors were not accepted due to abnormal peripheral blood counts. Thus, a total of 33853 donors were chosen, with a deferral rate of 3101(8.39%).

Table-1: Donor deferral based on duration

Cause of deferral	No.	%
Temporary deferred		
Anemia	2445	78.8
Drug history	101	3.2
High TLC	100	3.2
High hemoglobin	90	2.9
Donated within 90 days	37	1.1
Vein problem	35	1.1
Anxiety	30	0.9
Thrombocytopenia	28	0.9
Low BP	27	0.8
Malaria	20	0.6
Jaundice	18	0.5
Surgery	12	0.3
Transfusion history	10	0.3
Menstruation	8	0.2
Fever within 1 week	7	0.2
Under age	4	0.1
Under weight	4	0.1
Pregnancy	2	0.06
Total	2978	96.04
Permanent deferred		
Hypertension	113	3.6
Allergy/asthma	5	0.1
Cardiac problem	2	0.06
Diabetic	2	0.06
Renal failure	1	0.03
Total	123	3.96

The subjects' median age was 28 years, with a mean age of 29.0 7.2% (18-55) years. There were 3020 male donors (97.3%), and 81 female donors (2.6%). Overall, the vast majority (99%) of donors were replacement donors [n=3069], while only a small portion (1%) were voluntary donors [n=32].

The majority 2978(96%) of donors were temporarily deferred, whereas only a small fraction (3.9%) were permanently deferred (Table 1). Donors were primarily rejected due to donor safety [n=2840 (91.5%)], while recipient safety was the reason for rejection in 261(8.41%) of cases (Table 2). The most prevalent

Table-3: Complete spectrum of donor deferral

Cause of deferral	Female	Male	Total	%	P value
Anemia	44	2401	2445	78.8	0.001
Hypertension	0	113	113	3.6	-
Drug history	1	100	101	3.2	0.000
High TLC	0	100	100	3.2	-
High hemoglobin	0	90	90	2.9	-
Donated within 90 days	0	37	37	1.1	-
Vein problem	1	34	35	1.1	0.0001
Anxiety	2	28	30	0.9	0.001
Thrombocytopenia	0	28	28	0.9	-
Low BP	3	24	27	0.8	0.001
Malaria	0	20	20	0.6	-
Jaundice	0	18	18	0.5	-
Surgery	0	12	12	0.3	-
Transfusion history	0	10	10	0.3	-
Menstruation	8	0	8	0.2	-
Fever within 1 week	0	7	7	0.2	-
Allergy/asthma	0	5	5	0.1	-
Under age	0	4	4	0.1	-
Under weight	2	2	4	0.1	0.1
Pregnancy	2	0	2	0.06	-
Cardiac problem	0	2	2	0.06	-
Diabetic	0	2	2	0.06	-
Renal failure	0	1	1	0.03	-
Total	81	3020	3101	100	

reason for postponement was a low haemoglobin count (78.8%) followed by hypertension (3.64%) and a history of medication/drug consumption (3.25%) (Table 3).

The female deferral rate was 37.3% (81 out of 217 female donors) higher than the male rate of 8.2% (3020 deferred out of 36737 donors). In females, low haemoglobin levels, underweight, and menstruation were the three most common reasons for postponement. Anemia, hypertension, and a drug history were the three most common reasons for deferral in males, followed by elevated TLC counts.

Donors had mean haemoglobin of 11.41.0g/dl and hematocrit of 37.43.1. The mean cell volume (MCV) was 74.311.2, the mean cell height (MCH) was 22.95.3, and the mean cell height (MCHC) was 30.61.6. The mean platelet count was 297.688x10⁹/l and the mean total leukocyte count was 8.01.8x10⁹/l.

Table 2: Donor deferral based on donor or patient's safety profile

Deferred donors	No.	%
Donor safety		
Anemia	2445	78.8
Hypertension	113	3.6
High hemoglobin	90	2.9
Donated within 90 days	37	1.1
Vein problem	35	1.1
Anxiety	30	0.9
Thrombocytopenia	28	0.9
Low BP	27	0.8
Menstruation	8	0.2
Fever within 1 week	7	0.2
Allergy/asthma	5	0.1
Under age	4	0.1
Under weight	4	0.1
Pregnancy	2	0.06
Cardiac problem	2	0.06
Diabetic	2	0.06
Renal failure	1	0.03
Total	2840	91.5
Patient safety		
Drug history	101	3.2
High TLC	100	3.2
Malaria	20	0.6
Jaundice	18	0.5
Surgery	12	0.3
Transfusion history	10	0.3
Total	261	8.4

DISCUSSION

Understanding the causes of donor reluctance is essential for preventing the permanent loss of valuable donors. In the present study, we investigated donor deferral patterns to gain insight into the causes of donor rejection in our nation. We identified 3101 blood donors (8.39%) out of a total of 36954 potential donors who were deemed unfit for donation for various reasons; the majority (96.0%) were deferred on temporary grounds, and a subset (3.9%) were deferred permanently. The fact that the majority of donors can be re-entered into the donor pool is a blessing. In this study, the majority of deferred donors were males (97.3%); females accounted for only 2.6% of donors, but their deferral rate was significantly higher (37.3%) than that of males (8.2%).

Zou et al¹⁰ reported a deferral rate of 12.8%, whereas Arsalan et al¹¹ discovered a slightly higher deferral rate of 14.6% among Turkish donors. On a recent report from northern India, the deferral rate was revealed to be 5.1%. Rabeya et al¹² discovered a donor deferral rate of 5.6% among 4,138 donations from Malaysian donors. Lim et al¹³ reported a 14.4 percent donor deferral rate from Singapore. In a previous European study (France), Lawson-Ayayi et al¹⁴ determined the deferral rate in their series to be 10.8 percent. Interestingly, Di Lorenzo et al¹⁵ found a much higher deferral rate of 21.6% in their Brazilian study. This variable donor deferral rate may be attributable to differences in donor selection/recruitment criteria, diverse deferral criteria, sample size, geographical variation, or the overall health status of a given community.

In two previous regional studies from Pakistan, the deferral rate was determined to be 8.2% in western Pakistan and 9.2% in northern Pakistan.^{8,9} However, Tufail et al⁸ determined a deferral rate of 13.5%, of which 6.7% of donors were deferred because of anaemia and low platelets. We compared this result to regional studies' findings, which were similar; Indian and Malaysian studies revealed that anaemia was the most common reason for donor deferral.^{12,16} A recent Spanish study revealed a deferral rate of 8.7 percent, which was largely attributable to a low hematocrit. In our study, low haemoglobin was the most common reason for deferral, followed by hypertension and drug use, similar to what was reported in Indian donors by Agnihotri¹⁷ and Rathod et al.¹⁸ Recent research by Taneja et al¹⁹ identified anaemia (51%) as the leading cause, followed by medication history (18%) and abnormal blood pressure (6.8%). Also, Birjandi et al²⁰ from Iran reported that medication was the third most common reason for postponement. Low hematocrit levels were the primary cause of donor deferral in females. This was generally anticipated and consistently reported in other nations. 53.5% of female donors versus 6.9% of male donors were deferred significantly more frequently in an Indian study.^{17,20} Similarly, we found approximately five times more deferral in female donors than in male donors (37.3% versus 8.2%). These results merit notice, and additional steps should be taken to promote the general health of female donors. Therefore, this condition is easily treatable; a large number of temporarily deferred donors can be recruited back into the donor pool if the situation is properly managed.

Prior studies have classified deferred blood donors based on whether the deferral is temporary or permanent. In this study, 3.96% of donors were permanently deferred, possibly due to younger donors (median age 28 years). Custer et al²¹ reported a permanent deferral rate of 4.4%, while Bahadur et al¹⁶ reported a permanent deferral rate of 9.1%. 4.5% is the permanent deferral rate previously reported by Kasraian et al²² which coincides with our findings. According to De Lorenzo-Oliveria et al¹⁵ and Agnihotri¹⁷, the most common reason for permanent postponement was hypertension. In a study conducted by Zou et al¹⁰ in the United States, the deferral rate for a cohort of 47,814,370 donors was determined to be 12.8%, primarily due to donor safety concerns. Similar to our findings, other authors have reported an increase in deferrals based on donor safety.²⁰ The deferred donor has a very

negative attitude, and the majority of temporarily deferred donors will not return to blood banks in the future. Numerous studies have indicated that donor return rates are negatively impacted by donor deferral. Therefore, all prospective donors who are deferred for temporary reasons should be informed at the time of deferral of the reason for the deferral and its anticipated duration. Greater emphasis on temporarily deferred donors will ensure a steady flow of future contributions. To increase the effectiveness of the donation programme, donors must be properly advised and guided. As a reflection of our society's poor health status, the government and health authorities must implement preventive measures to reduce the prevalence of common causes of deferral, especially anaemia.

The donor deferral rate was typically higher for replacement donors than for uncompensated volunteers. We also determined that the majority of deferred donors (99%) were replacement donors [n=3069] and that only a small percentage (1%) were voluntary donors [n=32]. The most common reason for deferring voluntary donors was low haemoglobin [n=26] followed by hypertension [n=4] and a history of medication use [n=2]. Similarly, Sharma et al¹² found lower deferral rates (2%) among voluntary donors than among replacement donors (13.5%).

Our study demonstrates that donor deferral rates are comparable to other regional studies, with anaemia predominating. This analysis of deferral patterns will serve as the foundation for future blood donation-promoting health policies. We recommended that more female donors in multicenter studies at the national level to determine the incidence and spectrum of donor deferral. Education, motivation, and treatment of deferred donors will encourage them to become prospective donors in the future. Health policies must be revised, implemented, and effective, and should target blood donors' general health awareness.

CONCLUSION

The majority of donors were deferred due to abnormality in the profile of blood count mainly low haemoglobin level. The low haemoglobin counts were the most frequent cause of treatment delays, followed by hypertension and a history of medication usage. Only small numbers of donors were permanently deferred.

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