

Blood donation deferral pattern among prospective blood donors in northwest region of Pakistan

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Author's Contribution

¹designed and drafted the manuscript, ^{2,3,4} contributed in the literature review and data analysis. ⁵reviewed the manuscript for important intellectual content.

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ABSTRACT

Objective: To evaluate and monitor the causes of blood donor deferrals at a Regional Blood Centre in northwest Pakistan.

Methodology: This was a retrospective study of blood donor deferrals at the Regional Blood Centre in Peshawar. The blood donor data were extracted from the ZAAVIA blood transfusion information system (BTIS) database. The information and data expropriated from the database comprised of those from donor medical history questionnaire, physical examination (e.g. haemoglobin estimation), TTI screening results, and a decision on deferral (temporary and permanent).

Results: The study included a total of 42,570 potential donors presented for blood donation over a four years period (June 2016 – May 2020), out of which 41,817 donors met the inclusion criteria and donated blood. The total deferral rate was 6.37% (n=2,682). Among these deferred donors, 44.44% (n=1,192) were deferred temporarily whereas 55.56% (n=1,490) were deferred permanently. The leading causes of temporary deferrals included syphilis (14.16%), low haemoglobin (8.28%), and underweight (5.97%). On the other hand, hepatitis B (30.38%) was the main cause of permanent deferral followed by hepatitis C (21.59%). The general percentage of deferrals was higher among those less than 32 years of age (P<0.001), were females (P<0.001), and were first-time blood donors (P<0.001).

Conclusion: Blood donor deferral was responsible for 6.37% of all blood donations. The findings of the current study demands adequate preventive strategies to address the prevailing causes of deferrals such as low haemoglobin levels and infections with HBV and HCV.

Keywords: Blood, Safety, Donation, Deferral.

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Introduction

Blood donation and its subsequent transfusion to recipients are considered as an important life-saving intervention in healthcare emergencies. A well-organized blood transfusion service is imperative for the efficient

provision of health care services.¹ According to the World Health Organization (WHO), out of 118.2 million global blood collections, about 60% is collected in developing countries.² WHO further reports that there is an obvious difference in the blood donation rate between different countries. The median blood donation ratio in

high-income countries is 31.5 donations per 1,000 individuals while it is 15.9, 6.8, and 5.0 in upper-middle-income, lower-middle-income, and low-income countries, respectively. Also, at least 13 million donors were deferred owing to the presence of transfusion-transmitted infection (TTI). Due to this, blood donor recruitment and selection forms the basis of blood transfusion safety, intended to maintain the health of both donors and recipients.³

The WHO recommends the collection of blood from voluntary, non-remunerated blood donors (VNRBD) belonging to low-risk groups.² However, most blood donations in Pakistan are donated by family or friends on replacement basis with only a meager contribution by voluntary blood donors.^{4,5} The system is demand-driven rather than supply-driven placing an additional burden on the family of the patient.

Pakistan's national narrative on the blood donation aspect, the 'national blood donor policy' was drafted in 2011 to promote voluntary blood donations⁶ followed by a national strategic framework in 2014,⁷ and a blood safety legislation in 2016,^[8] to advocate the need for voluntary blood donations. All these strategic measures resulted in a sizeable increase in the percentage of voluntary blood donations over the last five years (18% VNRBD in 2018 compared to 10% VNRBD in 2013).⁹

Blood donor deferral is the lack of eligibility criteria among potential blood donors. Both temporary and permanent deferrals are associated with a reduction in donor pools and inadequate blood and blood components availability for transfusion.¹⁰ The frequency of blood donor deferrals differs widely,¹¹ however, regardless of the frequency of donor deferral, it is pertinent to mention that donor deferral is a global issue being faced by most blood centres in both developing and developed countries. On the whole, the blood donor deferral is a dejected experience for both the blood donor and the respective blood centre.¹² The identification of the causes for deferrals can steer the process of amendments in blood donor motivation and recruitment and retention strategies.¹³

However, the incidence and causes of blood donor deferrals are not well studied in Pakistan^[14] as the data management practices and reporting are still not well developed.^{15,16} There are 11 studies published so far and have reported data from the cities of Peshawar,¹⁷ Islamabad,^{18,19} Rawalpindi,^{20,21} Karachi,²²⁻²⁴ Mirpur,²⁵

Multan,²⁶ and Mandi Bahauddin.²⁷ The current study is the second from Peshawar after a gap of eight years and was undertaken to provide updated information regarding the frequency of blood donor deferrals and to recognize the causes of deferrals at the Regional Blood Centre in Peshawar over a period of four years. To the best of our knowledge, no previous study has been carried out in the current study population during the same period.

Methodology

The current study was a cross-sectional retrospective epidemiological analysis performed at the Regional Blood Centre, Peshawar, Khyber Pakhtunkhwa, over a period of four years from June 2016 to May 2020. The Peshawar Regional Blood Centre is established by the national Safe Blood Transfusion Programme as part of the first phase of the establishment of a nationwide network of 10 modern blood centres and an up-gradation of 60 existing hospital-based blood banks nationwide.

The donors were selected based on the standard pre-donation screening procedure, which particularized age (18–60 years), weight (> 50 kg), haemoglobin (> 12.5g/dl), medical history and physical examination.^[28] The blood donor data were extracted from the ZAAVIA blood transfusion information system (BTIS) database. The information and data expropriated from the database comprised of those from donor medical history questionnaire, physical examination (e.g. haemoglobin estimation), TTI screening results, and a decision on deferral (temporary and permanent). Donors who were not able to donate blood due to failure in access to suitable vein or vasovagal reaction, or any other donor adverse event, were not labeled as deferrals as these donors were otherwise fit for donation.

Data retrieved from the ZAAVIA BTIS database was transferred to the Microsoft Excel spreadsheet. Afterward, the data were cleaned, recorded, and analyzed through Statistical Package for the Social Sciences (SPSS version 22.0). Descriptive statistics were applied to analyze data and frequency tables and cross-tabulation were drawn and the data were described in numbers and percentages. The relationship between deferred and accepted donors was done through Pearson Chi-square test. Results of the difference were labeled statistically significant when p-value was < 0.05.

Ethical approval for performing out this study was obtained from the Ethical Committee of the Regional

Blood Centre. The data and all information acquired were used only for research purposes. Confidentiality of all donor data was ensured during the entire period of the study.

Results

A total of 42,570 potential donors presented for blood donation during the study period out of which 41,817 donors met the inclusion criteria and donated blood. The 41,817 donors who donated blood belonged to either voluntary non-remunerated blood donor (VNRBD) category 53.43% (n=22,343) or replacement donor category 46.57% (n=19,474). The majority of the blood donations were collected through blood donation camps or from blood collection sites 37,729 (90.22%) while remaining were collected at the Regional Blood Centre 4,088 (9.78%). A total of 1,929 blood units screened positive for one of the TTIs giving an overall prevalence rate of 4.61%. The majority of the donors were males 41,493 (99.22%) while 324 (0.78%) were females. The most common age group of donors was found to be 18-29 years (45.6%) followed by age group of 30-39 years (28.5%), while the least age group was 50-59 years (8.6%). Further, 28.3% of the blood donors belonged to type A blood group, 32.1% had type B, 28.2% had type O while 11.1% had type AB. In addition to this, 91.8% of the donors were Rhesus positive while 8.1% were Rhesus negative.

Deferrals occurred in 753 (1.76%) blood donors at the pre-donation stage while 1,929 (4.61%) were deferred due to screening reactivity for one of the TTIs. So the total deferral rate was 6.37% (n=2,682). Among these deferred donors, 44.44% (n=1,192) were deferred temporarily whereas 55.56% (n=1,490) were deferred permanently. Overall, from the pre-donation deferrals, females were deferred more (75.21% versus 24.79%) while from the deferral due to TTI reactivity, males were deferred more (91.01% versus 8.99%). The general percentage of deferrals was higher among those less than 32 years of age ($P<0.001$), were females ($P<0.001$), and were first-time blood donors ($P<0.001$). The leading causes of temporary deferrals included syphilis (14.16%), low haemoglobin (8.28%), and underweight (5.97%). On the other hand, hepatitis B (30.38%) was the primary cause of permanent deferral followed by hepatitis C (21.59%). The year-wise main causes for temporary and permanent deferrals are shown in Table I.

Table I: Causes of donor deferrals in Peshawar Regional Blood Centre 2016-20

Deferral causes	2016-17	2017-18	2018-19	2019-20	Total
Temporary causes					
Low haemoglobin	19	43	79	81	222 (8.28%)
Underweight	29	38	42	51	160 (5.97%)
Medications	01	10	14	26	51 (1.90%)
Obesity	01	04	09	12	26 (0.97%)
Menstruation	11	14	19	32	76 (2.83%)
High/low BP	12	11	28	34	85 (3.16%)
Gastroenteritis	01	07	11	14	33 (1.23%)
Syphilis	01	65	109	205	380 (14.16%)
Typhoid	0	01	04	06	11 (0.41%)
Malaria	0	52	05	02	59 (2.20%)
Fasting	01	02	05	09	17 (0.63%)
Recent blood donation	0	03	04	04	11 (0.41%)
Fever	01	06	09	16	32 (1.19%)
Over/Underage	02	06	08	13	29 (1.09%)
Permanent causes					
Hepatitis B	21	150	272	372	815 (30.38%)
Hepatitis C	04	124	177	274	579 (21.59%)
HIV/AIDS	06	24	35	31	96 (3.58%)
Total	110	560	830	1,182	2,682 (100%)

Table II provides a comparison of blood donor deferral patterns in different studies from Pakistan while table III provides a comparison of blood donor deferral patterns from other countries.

Discussion

The percentage of deferral patterns in blood centres around the globe is reported from 4.3% to 35.6% (Table III) while it ranges from 7.4% to 25.2% (Table II) in studies from Pakistan. This difference in percentage of deferral may be due of numerous blood donor selection criteria in different donor population and regional prevalence of TTIs.⁴⁶

In the current study, the deferral rate of blood donors from Pakistan's northwestern region for a 4-year duration was 6.37%. This deferral rate is the lowest reported so far when compared with earlier 11 studies from Pakistan.^[17-27] Similarly, our findings were on the lower side when compared with most of the studies from other countries.^{29, 30, 32-38, 40-43} However, lower deferral rates have been reported in Kota Bharu, Malaysia (5.6%)^[31], and Ha'il, Saudi Arabia (4.3%).³⁹

Table II: Deferral percentage with common causes in studies from Pakistan

Author (year) and City	Deferral percentage	Common causes of donor deferral
Khan <i>et al.</i> , (2012) ^[18] Peshawar	8.70%	Hypotension (22.22%), anaemia (13.33%), jaundice history (9.52%), underweight (6.03%)
Tufail <i>et al.</i> , (2013) ^[19] Islamabad	13.58%	Anaemia (4.9%), Hepatitis C (3.1%), thrombocytopaenia (1.8%), hepatitis B (0.81%)
Waheed <i>et al.</i> , (2016) ^[20] Islamabad	10.14%	Hepatitis B and C, Anaemia (41%), low body weight (22.5%), low blood pressure (5.1%), under/overage (5.9%)
Nadeem <i>et al.</i> , (2016) ^[21] Rawalpindi	7.4%	Hepatitis C (28.6%), anaemia (24%), hepatitis B (16.8%), syphilis (10.4%)
Khurram <i>et al.</i> , (2016) ^[23] Karachi	12.2%	Hepatitis B (4.7%), low haemoglobin (30.76%), thrombocytopaenia (19.35%)
Sultan <i>et al.</i> , (2017) ^[24] Karachi	8.39%	Anaemia (91.8%), leukocytosis (3.7%), polycythaemia (3.3%), thrombocytopaenia (1.0%)
Jamal <i>et al.</i> , (2018) ^[25] Karachi	24%	Therapeutic injections (31.2%), low haemoglobin (22.7%), flu, nausea, cough, headache symptoms (8.9%), severe untreatable ailment (4.2%)
Khalid <i>et al.</i> , (2018) ^[22] Rawalpindi	9.7%	Anaemia (52.4%), TTIs (34%), leukocytosis (19.7%), thrombocytopenia (4.8%)
Wazeer <i>et al.</i> , (2019) ^[26] Mirpur	12.1%	Anaemia (47.3%), underweight (21.1%), other medical causes (22.5%), menstruation (3.4%)
Iqbal <i>et al.</i> , (2020) ^[27] Multan	12.9%	Anaemia (50.3%), hepatitis C (19.2%), hepatitis B (11.3%), syphilis (8.3%)
Saeed <i>et al.</i> , (2020) ^[28] Mandi Bahauddin	25.2%	Hepatitis C (13.3%), hepatitis B (6.1%), syphilis (4.0%), malaria (2.4%), diabetes mellitus (1.9%)
Saba <i>et al.</i> , (2020) Peshawar (present study)*	6.37%	Hepatitis B (30.38%), hepatitis C (21.59%), syphilis (14.16%), low haemoglobin (8.28%), underweight (5.97%)

Table III: Deferral percentage with common causes in studies from other countries

Author (year) and City	Deferral percentage	Common causes of donor deferral
Lim <i>et al.</i> , (1993) ^[30] Singapore	14.4%	Recent intake of medicines, influenza, anaemia, high blood pressure, current sexual exposure in high-risk activity
Arsalan <i>et al.</i> , (2007) ^[31] Turkey	14.6%	Anaemia (20.07%), common cold (17.70%), high-risk behaviour (16.70%)
Rabeya <i>et al.</i> , (2008) ^[32] Malaysia	5.6%	Low haemoglobin (40.7%), Hypertension (29.4%), Diseases (15.6%), low blood pressure (3.5%), high haemoglobin (1.7%)
Charles <i>et al.</i> , (2010) ^[33] Trinidad and Tobago	35.6%	High-risk sexual activity (27.6%), anaemia (22.2%), hypertension (17.5%)
Gonçalves <i>et al.</i> , (2012) ^[34] Brazil	22.5%	Low haematocrit or haemoglobin, medical diagnosis, and higher-risk behaviour
Kouao <i>et al.</i> , (2012) ^[35] Ivory Coast	10.8%	Low haemoglobin (42.5%), new sexual partner (34.3%), a short interval of the last donation (4.6%), reactivity for a TTI (2.3%)
Mafirakureva <i>et al.</i> , (2013) ^[36] Zimbabwe	7.0%	TTI reactivity, low haemoglobin level
Ngoma <i>et al.</i> , (2014) ^[37] Japan	23%	Low haemoglobin (47%), questionnaire-based interview decision (36%), medication (11%)
Madrona <i>et al.</i> , (2014) ^[38] Spain	8.7%	Low haemoglobin (62.7%), medical interview-based (37.3%)
Gonzo <i>et al.</i> , (2016) ^[39] Namibia	8.6%	Anaemia (45.0%), pregnancy and breastfeeding (13.7%), medications (13.6%)
Alcantara <i>et al.</i> , (2016) ^[40] Saudi Arabia	4.3%	TTI positivity (35.2%), other medical conditions (25.5%), low haemoglobin (4.6%)
Shrivastava <i>et al.</i> , (2016) ^[41] India	11.5%	History of jaundice (28.2%), low haemoglobin (19.4%)
Al Shaer <i>et al.</i> , (2017) ^[42] UAE	19.4%	Low haemoglobin (9.29%), high blood pressure (2.22%), medical diagnosis and medication (1.53%), fever/flu/cough (1.33%)
Valerian <i>et al.</i> , (2018) Tanzania ^[43]	12.7%	Hepatitis B (29.6%), low haemoglobin (21.1%), HIV (13.3%), syphilis (9.3%)
Hatami <i>et al.</i> , (2018) Iran ^[44]	14.55%	Medications (15.6%), abnormal blood pressure (9.03%), polycythemia (8.5%), risky behaviours (6.3%)
Okoroiwu and Asemota (2019) ^[45] Nigeria	8.69%	Hepatitis B (31.71%), anaemia (21.95%), hepatitis C (18.90%)
Saba <i>et al.</i> , (2020) Peshawar (present study)*	6.37%	Hepatitis B (30.38%), hepatitis C (21.59%), syphilis (14.16%), low haemoglobin (8.28%), underweight (5.97%)

Our study comprised of 53.43% VNRBD and the remaining 46.57% family replacement donors. Some studies have reported an opposite arrangement where family replacement donors were greater than VNRBD.^{46,47} VNRBD are safer than replacement donors^[48] and could explain the low deferral percentage in the present study.

The leading cause of deferral at our regional blood centre was hepatitis B (30.38%) followed by hepatitis C. This finding is consistent with earlier national findings from

Islamabad and Karachi by Waheed *et al.*,¹⁹ and Khurram *et al.*,²² respectively. This finding is also consistent with those reported from Tanzania (HBV 29.6%),⁴² and Nigeria (HBV 31.71%).⁴⁴ In developing countries, anaemia is a grave public health problem. In Pakistan, an overwhelming majority of the general population is affected by anaemia. In our study, apart from TTIs, the commonest cause of deferral was low haemoglobin level (8.28%). Earlier studies have also mostly reported low haemoglobin levels as the leading cause of deferral.^{18,21,23,25,26} Similar finding has been reported from

Turkey,³⁰ Malaysia,³¹ Brazil,³³ Ivory Coast,³⁴ Japan,³⁶ Spain,³⁷ Namibia,³⁸ UAE,⁴¹ and India.⁴⁸ From the findings, it appears that there is little awareness of blood donor eligibility criteria among the general population as some of the potential donors with low haemoglobin may have known their status before presenting for blood donation since haemoglobin assessment is a simple and cheap screening test.

The majority of donors in our study were males (99.22%) which has implications on the research outcomes as some of the causes of deferral are more common in either males or females.

For instance, the participation of more males in the study reduced the deferral rates in two studies from India because females were deferred more than males owing to low haemoglobin levels.^{47,48} When compared with some of the earlier national studies, the present study duration was long. The study presented the combined data from the blood donor's medical history questionnaire and TTIs results, hence reviewing both pre-donation and post-donation deferral patterns simultaneously.

Conclusion

Although the reported deferral rate is on the lower side (6.37%) when compared with previous studies, this is still a significant percentage of deferrals. TTIs are the foremost reason of permanent blood donor deferrals where hepatitis B and C forms the main percentage of infections. Syphilis and low haemoglobin are a leading cause of temporary deferrals.

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