

First Report from Afghanistan on the Prevalence of Blood-Borne Infections: A Retrospective Cross-Sectional Multicentre Study for an Epidemiological Assessment

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Background: The transfusion of blood and blood components has a significant role in healthcare services. However, it remains a possible risk factor for blood-borne infections. The present study was conducted to assess the prevalence of serological markers of common blood-borne infections among the blood donor population of Afghanistan.

Methodology: This was a cross-sectional study based on retrospectively collected data over a period of six years from 284 blood centres across 34 provinces of Afghanistan. Every blood donor's sample was tested by rapid immunoassays for the serological markers of blood-borne infections namely hepatitis B surface antigen (HBsAg), anti-hepatitis C virus (anti-HCV), anti-human immunodeficiency virus 1/2 (anti-HIV1/2), and anti-Treponema pallidum (anti-TP).

Results: All blood donors during the study period were males. The majority of blood donations were from the family replacement category 56.93% (n = 544,568). The overall pooled prevalence of blood-borne infections was 4.36% with a comparatively higher percentage in family replacement donors 4.88%. The seropositivity for HBsAg, anti-HCV, anti-HIV1/2, and anti-TP was 2.95%, 0.81%, 0.04%, and 0.54%, respectively.

Conclusion: Complete reliance on voluntary blood donors and screening with quality assured highly sensitive assay is recommended to ensure blood safety in the country.

Keywords: blood, screening, Afghanistan, hepatitis, HIV, syphilis

Introduction

The transfusion of blood and blood components has proven to save millions of lives across the globe. However, unsafe transfusion of blood and blood components has a vital role in the spread of blood-borne infections. These infectious agents mainly include but are not limited to, Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Human Immunodeficiency Virus (HIV), Treponema pallidum (causing syphilis), and Plasmodium species (causing malaria). According to WHO, in middle and lower-income countries, the prevalence of blood-borne infections is on the higher side and quite far from attaining a zero-risk level.¹

In Afghanistan, a country engaged in continuous humanitarian crisis, blood transfusions services are not consistent as per international standards. For the Afghan National Blood Safety and Transfusion Service (ANBSTS), blood safety remains an issue of major concern for factors such as the absence of blood safety

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legislation, inappropriate infrastructure, financial constraints, lack of trained manpower, inadequate data management, and no national donor awareness campaign for donor selection and retention.

There is a dearth of available data from Afghanistan on the prevalence of blood-borne infections in blood donors. The limited data available is from studies and reports estimating the prevalence of these infectious agents in the general population and high-risk groups with small sample sizes.^{2–6}

The assessment of blood donors for blood-borne infections is of utmost significance to assess the burden and risk of blood-borne infections in the general population and provides a shred of scientific evidence for articulating blood safety policies, strategies, and standards. Therefore, the current study was planned to acquire data regarding the prevalence of common blood-borne infections among blood donors from 284 blood centres or blood banks in Afghanistan, covering the whole country. To the best of our understanding, this is the first epidemiological assessment report from Afghanistan on the prevalence of blood-borne infections in the blood donor population.

Materials and Methods

This was a cross-sectional study based on retrospectively collected data from 284 blood centres or blood banks scattered across 34 provinces of Afghanistan. These blood banks include central and regional blood banks of the Afghan National Blood Safety and Transfusion Service (ANBSTS) and numerous hospital-based blood banks working under the respective hospital management. ANBSTS was established in 2009 by the Ministry of Public Health and is solely responsible for all blood banking services across the country.^{7,8}

The study population included prospective blood donors irrespective of occupation, religion, education level, and any ethnic groups, who visited the blood banks over six years between 2015 and 2020.

The blood donors were considered fit for donation if they fulfilled the national criteria, ie weight >50 kg, age 18–60 years, haemoglobin 12.5–16.5 g/dl, blood pressure 120/80 mmHg, no previous history of hepatitis B and C, pregnancy, lactation, and/or menstruation. The blood donors who qualified for donation went through a behavioural screening interview, gave written consent, and donated blood. The behavioural screening interview entails filling out a donor history questionnaire that is made up of questions, grouped into common timeframes and based on principles of

cognitive psychology, to facilitate donor understanding and correct recall of related risk activities. Questions concerning related medications and travel history are also asked to ascertain donor eligibility to donate.

Every blood donor's sample was tested for the serological markers of blood-borne infections namely Hepatitis B surface antigen (HBsAg), anti-Hepatitis C virus (anti-HCV), anti-Human immunodeficiency virus 1/2 (anti-HIV1/2), and anti-Treponema pallidum (anti-TP). Briefly, 5 mL of blood was centrifuged at 5000 rpm for five minutes and plasma separated. The samples were screened for HBsAg, anti-HCV, and anti-HIV by SD Bioline rapid screening devices based on immunochromatographic principle (Standard Diagnostic Inc., South Korea). Screening for anti-TP was also performed through an Alere DetermineTM Syphilis rapid TP assay (Alere North America Inc., USA). The data were entered into Microsoft Excel and later transferred to the IBM Statistical Package for the Social Sciences (SPSS) software, version 24.0. Armonk, New York: IBM Corp. Errors and missing data were adjusted by running cross-tabs and frequency tables. Summary indicators such as frequencies and percentages were calculated. The results were presented using words and tables.

Results

A total of 956,509 individuals donated blood across 284 blood banks in Afghanistan between 2015 and 2020. Nearly 56.93% (n = 544,568) of the study participants belonged to family replacement donor's category while remaining were voluntary non-remunerated blood donors (VNRBD) 43.07% (n = 411,941). Most of the blood donors 65.36% (n = 62,518) were first-time donors.

All blood donations (100%) reported in the 6-year study period were from male donors. The median age of the donors was 24.2 years, with the age range between 18 and 57 years. Most of the donors 42.91% (n = 410,529) were of age 18–30 years followed by 35.51% (n = 339,556) who were in the age range between 31 and 40 years (Table 1).

The overall pooled prevalence of the four blood-borne infectious markers in the current study was 4.36%. The prevalence in replacement donors was higher at 4.88% compared to voluntary blood donors that was 3.66%. Among the individual infections, the hepatitis B virus was among the most prevalent infection 2.95% (n = 28,296). Table 2 shows the different types of blood-borne infections among the blood donor population.

Table 1 Socio-Demographic Characteristics of Blood Donors in Present Study (n = 956,509)

Age Group	Number of Donations	Percentage (%)
18–30 years	410,529	42.92
31–40 years	339,556	35.51
41–50 years	167,379	17.49
> 50 years	39,045	4.08
Total	956,509	100.0
Sex		
Male	956,509	100.0
Female	0	0
Total	956,509	100.0
Types of Donation		
Replacement	544,568	56.93
VNRBD	411,941	43.07
Total	956,509	100.0

Discussion

The prevalence of blood-borne infections among blood donors indirectly echoes the burden of these infections in the population because blood donors represent healthy members of the society.

Afghanistan is facing serious challenges in blood availability and safety due to years of conflict causing a humanitarian crisis. The transfusion of blood and blood components is considered a possible risk factor for the transmission of blood-borne infections posing a threat to the potential recipients. The present study assessed the prevalence of blood-borne infections among blood donors in Afghanistan over six years' period.

A vast majority (42.92%) of the blood donors in the present study were between 18 and 30 years. This finding was consistent with studies from Pakistan (45.6%),⁹ Kenya (42.24%),¹⁰ and Tanzania (44.7%).¹¹ The blood donors in the present study had their mean ages 10–15 years less than those observed in developed western countries.¹²

A possible reason for this difference could be due to the fact that more than 60%¹³ of the general population in Afghanistan is younger than 30 years and demographics are reflected in blood donors also. From the perspective of the voluntary blood donor programme, the emergence of this large cohort of young people is promising.

The current study showed that 43.07% (n = 411,941) of blood donations came from voluntary non-remunerated blood donors (VNRBD) with remaining 56.93% (n = 544,568) being family replacement donors. This is an encouraging finding from a low-income country like Afghanistan. This percentage of voluntary blood donations, although still far from WHO's goal of 100% VNRBD,¹⁴ is better than regional countries including Pakistan,¹⁵ and Bangladesh.¹⁶

There was an absence of female donations and all donors were males. This deficiency of female donations is a source of concern for the national blood service (ANBSTS) as it designates that nearly 48% of the population is not donating. It is believed that lack of female-friendly facilities, nutritional status, prejudices, misconceptions, cultural and social factors contribute to low female donation rates. It is essential to lower the barriers erected by the gatekeepers of family, community, and society, through a public awareness campaign addressing the issue of female donations as one of the principal target areas, among others.

The overall pooled prevalence of infectious markers in our study was 4.36%. Earlier studies from India¹⁷ (4.36%), Ghana¹⁸ (4.06%), Pakistan¹⁹ (4.0%), and Eritrea²⁰ (3.6%) have reported a similar trend. However, the percentage was on the lower side when compared with Nigeria²¹ (28.8%), Bangladesh¹⁶ (7.8%), Ethiopia²² (11.5%), and Tanzania¹¹ (10.1%).

The pooled prevalence of infectious markers significantly dropped in 2020 (2.80%) compared to the years 2015 to 2019 (between 4.12% and 6.26%). This decreased

Table 2 Prevalence of Blood-Borne Infections in Blood Donors 2015–20 (n = 956,509)

Year	Total Blood Donations	HBV	HCV	HIV	Syphilis	Total
2015	64,126	3.59% (n=2306)	0.85% (n=549)	0.06% (n=44)	0.78% (n=504)	5.30% (n=3403)
2016	122,695	3.16% (n=3878)	0.59% (n=733)	0.01% (n=21)	0.36% (n=449)	4.14% (n=5081)
2017	155,715	3.05% (n=4752)	0.60% (n=949)	0.07% (n=111)	0.39% (n=610)	4.12% (n=6422)
2018	179,781	3.74% (n=6733)	1.41% (n=2541)	0.04% (n=89)	1.05% (n=1895)	6.26% (n=11,258)
2019	210,627	2.68% (n=5657)	0.97% (n=2058)	0.04% (n=88)	0.70% (n=1486)	4.41% (n=9289)
2020	223,565	2.22% (n=4970)	0.41% (n=921)	0.03% (n=80)	1.13% (n=294)	2.80% (n=6265)
Total	956,509	2.95% (n=28,296)	0.81% (n=7751)	0.04% (n=433)	0.54% (n=5238)	4.36% (n=41,718)

prevalence may be explained by the capacity development workshops for the donor recruitment staff over the last two years by the ANBSTS. The trainings focused on donor recruitment and retention strategies, donor deferral criteria, donor behavioural screening, and donor haemovigilance.

The present study indicated that HBV (2.95%) is the most prevalent infection among blood donors in Afghanistan. This is comparatively lower than studies from neighboring countries, India²³ (3.44%) and Pakistan²⁴ (3.91%), and those reported from Ethiopia²⁵ (4.2%). This may be attributed to the effective prevention and control mechanisms including mandatory vaccination programmes. However, when compared with a study from Saudi Arabia (0.33%),²⁶ our finding was on the higher side. The infection with HBV results in a permanent deferral of blood donors, hence reducing the pool of potential blood donors in the general population.

The seroprevalence of HCV in the present study was 0.81%, which is high when compared with a study from Bangladesh²⁷ (0.03%). Our finding was on the lower side when compared to previous studies from Sudan²⁸ (1.40%), Pakistan²⁹ (3.26%), Kenya³⁰ (3.21%), and Nigeria²¹ (3.6%). This can be linked to the low prevalence of the HCV among the general Afghan population (0.7%).⁶

In the present study, the seroprevalence of HIV among blood donors was 0.04%. This is comparable to a study from Pakistan³¹ (0.06%). However, it is on the lower side when compared to previous studies conducted in Saudi Arabia²⁶ (0.13%), India³² (0.6%), Nigeria²¹ (4.2%), and Sudan (2.61%).²⁷ A possible reason for this lower rate of HIV infection could be a decrease in the prevalence of HIV at population level and due to enhanced effectiveness of the blood donor awareness programme in ensuring behavioural screening.

The pooled prevalence of syphilis among blood donors was 0.54%. However, throughout the study period, it showed a fluctuating trend, eg, it was 0.78% in 2015, 0.36% in 2016, and 1.13% in 2020.

The overall syphilis prevalence in present study (0.54%) is comparable to earlier studies from Qatar³³ (0.43) and Pakistan³⁴ (0.72%). On the other hand, studies from Bangladesh²⁶ (0.20%), USA³⁵ (0.16%), Saudi Arabia³⁶ (0.04%), and India³² (0.05%) reported a lower prevalence rate for syphilis in blood donors. Conversely, it is lower than 5.72% in Sudan,²⁷ 3.1% in Nigeria,²¹ and 1.9% in Tanzania.¹¹

The difference in the prevalence percentages is dependent on several factors including sample size, study site, society behaviour towards voluntary blood donations,

socioeconomic status, literacy rate, and the quality of screening assay used.

Limitations

The samples were tested through rapid screening devices, and no confirmatory testing such as ELISA, CLIA, or NAT was performed. No associated risk factors and several socio-demographic features of the blood donor were included due to insufficient data/errors in data reporting. All donations were from male donors, the prevalence in the female population was not available.

Conclusion

The blood-borne infections remain a threat to blood safety, thus 100% reliance on voluntary blood donors and screening with quality assured highly sensitive assay is recommended to ensure blood safety in the country. Additional studies are needed to detect the main risk factors and formulate intervention strategies.

Data Sharing Statement

The datasets generated during and/or analysed during the current study are not publicly available due to confidentiality issues but are available from the corresponding author on request.

Ethics Approval and Consent to Participate

The study was approved by the National Research Ethics Committee of the Ministry of Public Health and all study participants, ie, blood donors, provided a written consent. The study was conducted in accordance with the World Medical Association Declaration of Helsinki.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to

which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

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