

SURVEILLANCE OF HIV INFECTION IN BLOOD DONORS IN PAKISTAN: A SYSTEMATIC REVIEW

Usman Waheed, Muhammad Arshad*, Javaid Usman**, Ahmed Farooq*, Akhlaaq Wazeer**, Hasan Abbas Zaheer

Shaheed Zulfiqar Ali Bhutto Medical University Islamabad Pakistan, *International Islamic University Islamabad Pakistan, **Ministry of National Health Services Islamabad Pakistan

ABSTRACT

Objective: To determine the prevalence of human immunodeficiency virus (HIV) in blood donors in a tertiary care hospital blood bank and then compared with prevalence in other reported studies in Pakistan between 1988 and 2016.

Study Design: Prospective single centre study with systematic review.

Place and Duration of Study: Department of Blood Bank, Shaheed Zulfiqar Ali Bhutto Medical University, PIMS Hospital Islamabad, from Jan 2015 to Dec 2016.

Material and Methods: Blood donors were screened for the prevalence of HIV, from Jan 2015 to Dec 2016. Meta-analyses were gathered from the reported HIV incidence in blood donors from across Pakistan during 1988–2016 by searching through Google, Pub Med, and Pak Medi Net (for Pakistani non-indexed journals).

Results: A total of 54,877 blood donors were screened for HIV by Chemiluminescent immunoassay (CLIA), of which 75 (0.13%) male donors were found reactive for HIV. The mean prevalence of HIV from 2006–2016 was 0.06% while 0.13% in 47 studies conducted during the period 1988–2016.

Conclusion: The prevalence of HIV in apparently healthy blood donors is steadily increasing in Pakistan. Concerted efforts need to be made to ensure that blood is adequately screened for HIV in every blood bank in the country.

Keywords: Blood, Screening, Donors, HIV, Pakistan.

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INTRODUCTION

Acquired immunodeficiency syndrome (AIDS) is caused by two types of human immunodeficiency viruses (HIV)¹. AIDS is an ailment which attacks and destroys the human immune system^{2,3}. Despite the awareness and prevention campaigns across the world, AIDS kills one person after every three minutes⁴. Thus, about 280 people die with HIV/AIDS each day with a death rate of 20 patients per hour⁴. The disease is thus perceived as a threat to any society's social and financial foundations. According to the joint United Nations programme on HIV and AIDS (UNAIDS), HIV/AIDS has claimed more than 35 million lives since 1981 and an estimated 36.7 million people lived with HIV at the end of 2015 while 2.1 million acquired new

infections⁵.

HIV infection resulting from contaminated blood transfusion has been documented repeatedly since 1982⁶. The risk of contracting HIV through transfusion of blood is expected to be one in 1.5 million in the United States of America (USA)⁷. The risk of HIV transmission through transfusion of infected blood or blood products surpasses that of any other risk exposure. Ninety percent of the patients transfused with HIV infected blood were found to be HIV infected at follow-up⁸. The rate of HIV infectivity with packed red cells is inversely proportional to the storage time, i.e. HIV infected packed red cells stored for less than 8 days are 96% infectious, and those stored for more than 3 weeks remain 50% infectious⁸.

HIV epidemic is an increasing health concern in Pakistan. In the absence of a centralized blood-banking system, there is no reliable source which could provide comprehensive data on the

Correspondence: Dr Usman Waheed, Blood Bank Section, SZAB Medical University Children Hospital PIMS, G-8/3 Islamabad Pakistan (Email: usman.waheed07@gmail.com)

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estimated risks of HIV infection in blood donors. Pakistan is a signatory to the United Nations (UN) resolutions including the millennium development goals to combat HIV/AIDS⁹ by 2015, and also the sustainable development goals which aim to end the epidemic of AIDS by 2030¹⁰. In Pakistan, the first case of HIV was diagnosed in 1986 and was reported in 1987¹¹. Since then, the number has increased and according to the national estimates, there are 102,000 individuals infected with HIV¹². Due to high prevalence of HIV in high risk groups¹³, the epidemic is classified as concentrated phase of the epidemic. The mode of transmission largely remains heterosexual (52.55%) followed by blood transfusion (11.73%)^{14,15}. In Pakistan, HIV screening is mandatory under the blood safety legislations¹⁶. The national strategies¹⁷ to minimize the risk of HIV transmission are the use of behavioral screening questionnaires to defer donors at higher risk of HIV infection and screening the blood with highly sensitive and specific laboratory tests.

Assessing the pattern of HIV in a blood donor is necessary to ensure blood safety and also to inform the policy makers on the magnitude of the disease in the apparently healthy population. The current study was conducted to assess the prevalence of HIV among the healthy blood donor population of Islamabad capital territory and its catchment area. A literature search was done to compare the results with the previously reported statistics from across the country.

MATERIAL AND METHODS

This is a prospective single centre study with systematic review. All donors who donated blood from January 2015 to December 2016, at the Shaheed Zulfiqar Ali Bhutto Medical University Hospital Blood Bank, Islamabad, were included in the study. The centre is a tertiary care university hospital in the federal capital providing services to the adjoining provinces also. The donors were selected according to pre-established national donor selection criteria

considering body weight, haemoglobin, blood pressure and behavioral screening¹⁸. The blood donors not fulfilling the minimum criteria of donation were excluded from the study. The qualifying donors were informed of the objectives of the study, consent was obtained and blood donation was collected in a triple or quadruple blood bag following standard protocol. A total of 54,877 blood donors were included in the study through convenience sampling technique. A vast majority of the donors belonged to family/replacement category.

The blood samples for screening of HIV were collected from the donated blood in a gel tube, centrifuged at 4,000 rpm for 5 minutes and the serum tested for the presence of antibodies to HIV1/2 by chemiluminescence immunoassay on the fully automated architect i2000 system (Abbott Laboratories, Abbott Park, IL, USA).

All serum samples testing reactive were repeated using the same sample on Abbott Architect i2000 system and a rapid HIV testing device (Alere Determine™ HIV-1/2, Alere North America Inc. USA). If the sample was again reactive, the donor was re-called and a fresh sample was collected. If the donor sample was found reactive by both methods, the sample was reported positive and bag was discarded in the hospital incinerator.

The results of the study were compared with the previous 10 years data of the same centre to see the trend over this period. A comprehensive literature survey was done to shortlist national/local studies with similar experimental settings, for subsequent comparison of HIV prevalence results among blood donors. The search was done by using the keywords; HIV prevalence, blood donors and Pakistan, in Pubmed, PakMediNet and Google. Inclusion criteria involved the studies indicating the prevalence of HIV in the Pakistani blood donor population while all other studies were excluded. We went through the titles and abstracts to select appropriate studies. In case of any ambiguity, the full text of the study was reviewed. Forty seven

articles and abstracts were acquired from the literature search, published from 1988 to 2016 and included in the study. Manuscripts in the category of review articles, case reports and editorials were excluded. The data pertaining to the duration of study, city (province), sample size and percentages of reactive cases were extracted from the articles included in the literature review.

The frequencies, and percentages were calculated using statistical package for social sciences version 20 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.). Chi square goodness of fit test was used to see the trend. A *p*-value of <0.05 considered as a statistically significant value.

RESULTS

A total of 54,877 blood donors were tested for the presence of antibodies to the HIV during

The prevalence of HIV positivity during the last 11 years period (2006-2016) showed a significant change (*p*-value=0.016) over a period of time. The mean prevalence was 0.06% (table-I).

The data gathered from the 47 studies⁽¹⁹⁻⁶⁵⁾ conducted from 1988-2016, on the prevalence of HIV infection in Pakistani blood donor population is presented in table-II.

A total of 3,100,409 donors were screened in these 47 studies. Nineteen of the studies reported zero prevalence of HIV and the mean positivity of HIV infection in remaining 28 studies was 0.13%. The prevalence of HIV infection in healthy donors ranged from 0.008% in Peshawar city³¹ to 1.0% in Gwadar city⁵⁹.

DISCUSSION

Pakistan has a well-established low prevalence but concentrated phase epidemic of

Table-I: Year-wise incidence of HIV.

Year	No. of Donors Tested	HIV positive (n)	HIV positive (%)
2006	17,065	3	0.01
2007	18,941	8	0.04
2008	18,490	2	0.01
2009	19,707	13	0.06
2010	20,584	11	0.05
2011	22,959	16	0.06
2012	22,534	14	0.06
2013	24,402	10	0.04
2014	26,146	17	0.06
2015	27,305	33	0.12
2016	27,572	42	0.15

these 24 months. Of these donors, 54,454 (99.23%) were males and 423 (0.77%) donors were females. Out of them, 77 were found initially reactive for HIV. The repeat testing resulted in 75 (0.13%) positive donors. All positive donors were males.

A high rate of HIV positivity 45.3% (34/75) was seen in the age category of 18-30 years and a small portion 4.0% (3/75) were in the age range of 51-60 years. The 31-40 years category showed the second highest clustering of HIV positives, 41.3% (31/75) followed by 9.3% (7/75) in the age range of 41-50 years.

the HIV. A combination of risk factors are currently placing the country at a high risk of further expanded transmission from high to low risk groups through bridging populations. Transmission of HIV from blood and blood components is a major source of infection in Pakistan that is usually under estimated. Screening for transfusion-transmissible infections including HIV is important to ensure blood safety. The data regarding the incidence of HIV in blood donors in Pakistan shows a continuous increase in the risk of acquiring HIV through blood transfusion.

The prevalence of HIV in our study was (0.06% versus 0.13%). However, when compared

Table-II: HIV in blood donors reported from 1988-2016 in Pakistan.

S. No.	Author	City (Province)	Year	No. of Donors Tested	HIV Prevalence (%)
1.	Mujeeb SA ¹⁹	Karachi (Sindh)	1988	523	0.6
2.	Khanani R ²⁰	Karachi (Sindh)	1988	121	0.82
3.	Mujeeb SA ²¹	Karachi (Sindh)	1991	1,655	0.18
4.	Raziq F ²²	Peshawar (KP)	1993	33,402	0
5.	Mujeeb SA ²³	Karachi (Sindh)	1993	666	0
6.	Kayani N ²⁴	Karachi (Sindh)	1994	32,127	0.003
7.	Kakepoto GN ²⁵	Karachi and Hyderabad (Sindh)	1996	51,257	0.02
8.	Iqbal J ²⁶	Lahore (Punjab)	1996	12,482	0
9.	Ahmed F ²⁷	Abbottabad (KP)	2000	960	0
10.	Rahman M ²⁸	Punjab	2002	910,706	0.001
11.	Khattak MF ²⁹	Rawalpindi (Punjab)	2002	103,858	0.007
12.	Mumtaz S ³⁰	Rawalpindi (Punjab)	2002	553	0
13.	Khan Z ³¹	Peshawar (KP)	2002	23,278	0.008
14.	Sheikh AA ³²	Quetta (Balochistan)	2004	5,000	0.22
15.	Asif N ³³	Islamabad	2004	3,430	0.23
16.	Zaidi A ³⁴	Peshawar (KPK)	2004	41,076	0
17.	Sirhindi GA ³⁵	Lahore (Punjab)	2005	18,216	0
18.	Khan MA ³⁶	Liaquatpur (Punjab)	2006	1,426	0
19.	Fayyaz M ³⁷	Bahawalpur (Punjab)	2006	27,938	0
20.	Sultan F ³⁸	Lahore (Punjab)	2007	41,498	0.06
21.	Azam M ³⁹	Karachi (Sindh)	2007	688	0.14
22.	Khan ZT ⁴⁰	Rawalpindi (Punjab)	2007	139,163	0
23.	Bhatti FA ⁴¹	Rawalpindi (Punjab)	2007	94,177	0.004
24.	Niazi A ⁴²	Rawalpindi (Punjab)	2008	4,427	0
25.	Manzoor I ⁴³	Lahore (Punjab)	2009	6,659	0.05
26.	Shah SAR ⁴⁴	Lahore (Punjab)	2009	60,719	0.006
27.	Qazi A ⁴⁵	Peshawar (KP)	2010	100	0
28.	Shaikh ZA ⁴⁶	Karachi (Sindh)	2010	2,000	0
29.	Khan A ⁴⁷	Peshawar (KP)	2011	3,915	0
30.	Borhany M ⁴⁸	Karachi (Sindh)	2011	5,717	0
31.	Safi SK ⁴⁹	Peshawar (KP)	2011	62,251	0.045
32.	Attaullah S ⁵⁰	Peshawar (KP)	2012	127,828	0.06
33.	Waheed U ⁵¹	Islamabad	2012	10,145	0
34.	Moiz B ⁵²	Karachi (Sindh)	2012	23,559	0.051
35.	Umair M ⁵³	Mirpur (AJK)	2012	8,927	0
36.	Butt KK ⁵⁴	Kasur (Punjab)	2013	833	0
37.	Irfan SM ⁵⁵	Karachi (Sindh)	2013	108,598	0.10
38.	Khattak MU ⁵⁶	Peshawar (KP)	2014	6,000	0.13
39.	Kamran M ⁵⁷	Rawalpindi (Punjab)	2014	300	0
40.	Zaheer HA ⁵⁸	Islamabad	2014	160,376	0.017
41.	Sheikh A ⁵⁹	Gwadar (Balochistan)	2015	300	1.0
42.	Hussain A ⁶⁰	Multan (Punjab)	2015	480,20	0.01
43.	Niazi SK ⁶¹	Rawalpindi (Punjab)	2016	160,552	0.02
44.	Ghani E ⁶²	Rawalpindi (Punjab)	2016	626,413	0.01
45.	Sultan S ⁶³	Karachi (Sindh)	2016	148,268	0.11
46.	Saeed M ⁶⁴	Lahore (Punjab)	2016	18,274	0.02
47.	Zameer M ⁶⁵	Lahore (Punjab)	2016	10,048	0.11

comparatively low when compared with the mean HIV prevalence reported from 1988-2016

with some of the individual studies, our results indicated a rise in the seroprevalence of HIV⁽⁶³⁻⁶⁵⁾.

The literature search has shown that over the past 18 years, 47 blood banks have reported the HIV prevalence while the total number of blood banks in the country is estimated to be 1830⁶⁶. It is evident that the data is not representative of all the blood banks. The data of all blood banks representing their provinces must be collected to establish a consolidated figure of HIV positive patients. There is a wide diversity in the screening techniques used for HIV screening the blood banks ranging from rapid point-of-care devices to highly specialized nucleic acid testing, hence lacking standardization.

The data of HIV prevalence in Pakistani blood donors were compared with other countries. The prevalence rate of 0.13% in our study was comparatively lower than those reported by Nepal in 2009 (0.21%)⁶⁷, China in 2014 (0.31%)⁶⁸, Ethiopia in 2010 (3.8%)⁶⁹, Nigeria in 2008 (2.8%)⁷⁰ and Burkina Faso in 2009 (2.21%)⁷¹ but higher than those reported from India in 2012 (0.1%)⁷², Iran in 2011 (0.0054%)⁷³, Italy in 2005 (0.00019%)⁷⁴ and Australia in 2008 (0.0003%)⁷⁵. These disparities in the prevalence of HIV infections might be due to differences in preventive measures, awareness through educational programmes and safety measures implemented in blood transfusion centres of these countries.

Extensive donor selection through behavioral screening and quality assured serological screening methods can improve blood safety. According to earlier studies, the prevalence of HIV may be lowered up to 2 in 1 million⁷⁶ or even lesser⁷⁷ through behavioral screening of the donor and quality assured serological screening of blood units.

A few years back, the detection of HIV in blood banks was a rare phenomenon; however, it is now not as uncommon. There is a huge gap (102,000 versus 16,300) between the estimated number of cases and the cases registered with treatment centers¹². As the findings of the current study indicate a significant proportion of previously unidentified cases as HIV positive, the

question arises, whether these are the new cases or the missing cases. However, route of infection requires to be traced out and measures and policies are required to be imposed regarding the registration of HIV patients.

The epidemic in high risk groups is well established including the migrant workers. A substantial number of HIV cases registered are from migrant workers who are working/deported from Gulf States when tested and found HIV positive. These workers represent a high risk population because of their higher rates of unguarded sex with sex workers or spouses. The fact is well established regarding the high prevalence of HIV among people returning from abroad but their exact proportion is not known. A comprehensive policy regarding the HIV testing of workers deported from gulf countries is needed.

CONCLUSION

Our study highlighted static endemicity of HIV in our population. Specific recommendations include the availability of a volunteer blood donor pool and adequate blood donor screening, public awareness/information, regarding modes of spread of HIV/AIDs counseling and confidentiality. Implementation of standardized screening protocol and use of highly sensitive tests will reduce the risk of transmission. The data from all blood banks is also required to determine exact percentage of HIV patients in our country. Moreover, transfusion practices must be monitored and rationalized so that HIV transmission from unnecessary transfusions does not occur.

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CONFLICT OF INTEREST

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