Original Article

Revisiting Reactive Blood Donor Demographics - A Single Center Experience

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ABSTRACT

OBJECTIVES: Evaluation of reactive donor demographics is helpful in assessing the risk of transfusion transmittable diseases (TTDs) which assists in formation of long term strategies to improve public health, assessing quality and effectiveness of donor screening, and prevent disease spread.

This study was conducted to assess the impact of education and age on sero-reactive first time and repeat blood donors in order to identify gaps between knowledge and awareness in urban replacement blood donors of a developing country.

METHODS: A cross sectional observational study was conducted at the blood bank of Liaquat National Hospital & Medical College, Karachi from July 2014 to June 2016. This study reviewed the demographic features of reactive blood donors during two year period. Comparative analysis of transfusion transmittable disease pattern with last 10 year data was performed. Reactive donors during the study period were grouped into first time and repeat donors and their association with different age groups, level of education and type of disease was sought using chi square test.

RESULTS: We found a sero-prevalence for HBsAg as 1.64%, HCV 2.13%, HIV1 & 2 0.10%, Syphilis 1.73%, and for Malaria as 0.005%. Trend analysis showed mild reduction in HCV reactivity for the study period. 67.3% (n=382) of first time donors and 45.8% (n=585) repeat donors belonged to the youngest age bracket of 15-29 years. Donation status was found to have significant association with age group (p≤0.05), level of education (p≤0.05) Hepatitis B reactivity (p≤0.05) and VDRL sero-positivity (p≤0.05).

CONCLUSION: Our study showed that education, age, HBsAg and VDRL infectivity affects both groups of reactive donors. Continuous monitoring of donor demographics can help in assessing and revising policies for donor awareness and transfusion transmittable disease control and prevention.

KEY WORDS: Reactive blood donors, Transfusion transmittable diseases, donor demographics.

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INTRODUCTION

Demand for blood component therapy is steadily growing in Pakistan due to continuous expansion in population which currently stands at 182 million. Major consumers of blood products include patients with trauma, obstetrical emergencies and Thalassemia Major. Similar to other developing countries, our donor pool comprises of mostly replacement donors who donate blood on need basis for friends and family. According to the data collected from 324 blood banks for WHO global database on blood safety in Pakistan, there were 15.4% voluntary non-remunerated blood donations while 84.6% were replacement/family donations in the year 2011[1]. In India voluntary donors constitute 58% of the donor pool[2].According to data reported to WHO, the highest increase of voluntary unpaid blood donations is seen in the African (85%) and South-East Asian (74%) regions[3]. Replacement donors tend to hide important information during donor assessment interview prior to donation; increasing the risk of transfusion transmittable diseases(TTDs). In Pakistan, transfusion of blood and blood products were found to be the third commonest cause of Hepatitis C disease transmission[4]. The overall prevalence of HBV and HCV in Pakistan is 2.5% and 4.8% respectively, reflecting a combined infection rate of 7.6% and an ongoing high burden of chronic liver disease in the general population[5] . A large population of donors is unaware about the different modes of catching TTDs. Contrary to first time donors, repeat donations sensitize people about the potential hazards of transfusions as they undergo the selection process. Evaluation of reactive donor demographics is helpful in assessing the risk of TTDs which assists in formation of long term strategies to improve public health,

assessing quality and effectiveness of donor screening, and prevent disease spread.

Our study was conducted at the blood bank of the hospital with the objective to determine the frequency of TTDs among two groups of donors; first time and repeat and to look for association of donation status with different age groups, educational level and types of disease.

MATERIAL AND METHODS

A cross sectional observational study was conducted at the blood bank of Liaquat National Hospital, Karachi from July 2014 to June 2016. All the donors who tested sero-positive for HBV, HCV, Syphilis and HIV1 and 2 on the basis of screening tests were included which constituted a sample size of 1844 donors. The tests were performed by Chemiluminescent Immunoassay (CIA) method on Architect i2000 (Abbott Diagnostic, USA) following appropriate controls.MP-ICT was used to determine the presence of malaria. Sero-negative samples for HBV, HCV, and HIV1 and 2 were tested by Nucleic Acid Amplification Test (NAT) using multiplex Polymerase Chain Reaction Test (Cobas Taq screen MPX, Roche Molecular Diagnostics), using a pool of six samples. The same assay was utilized for pool resolution by individual testing of six samples in a reactive mini-pool. The test incorporates an internal control for monitoring test performance in each individual test as well as the Amperase enzyme to reduce potential contamination by previously amplified material (amplicon).

The data was compared with last 10 year in-hospital record of reactive donors to see the trend. Statistical package for social sciences (SPSS 21) was used for data compilation and analysis. Mean± SD was calculated for quantitative variables. Frequency and percentage were calculated of qualitative variables. Effect modifiers were controlled by stratification. Reactive donors were divided into 2 groups; first time donors and repeat donors; with a donation history of more than once in their lifetime. Each group was graded based on their education level into primary (illiterate or educated till grade5), secondary (education level from grade 6 to grade 12) and tertiary (education level of grade 13 upwards). The age was stratified into four groups (18-29, 30-39, 40-49 and ≥50 years). Post stratification, chi-square test was applied. P-value ≤0.05 was considered as significant.

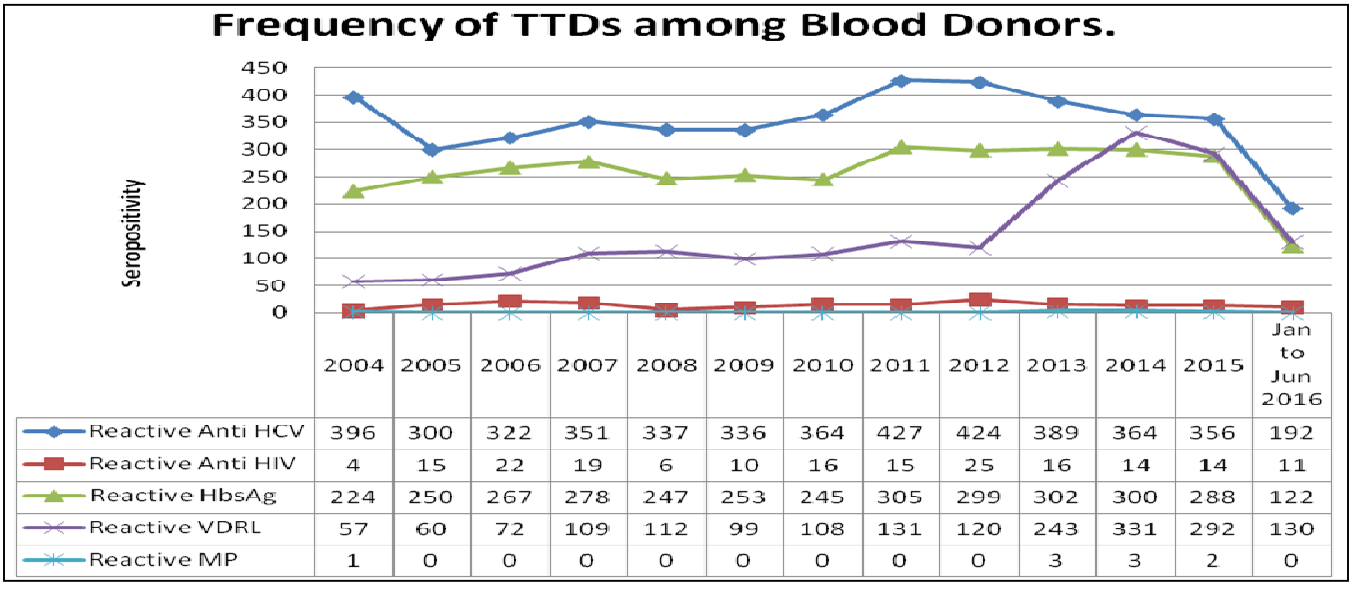
The study protocol was approved by the institutional review board and ethical committee of Liaquat National Hospital and Medical College.

RESULTS

From July 2014 to June 2016, a total of 33595 donations were made at the blood bank of Liaquat National Hospital out of which 1844(5.48 %) donors were rejected on positive screening results for HCV, HBV, HIV1&2, Syphilis or Malaria. All reactive donors were male replacement donors. Sero-prevalence for HBsAg was1.64%, HCV 2.13%, HIV 0.10%, Syphilis 1.73%, and Malaria was 0.005%. (**Figure I**) Descriptive statistics of reactive donors is shown in (**Table I**). Among study donors mean age was 29.58±7.113 years. One third of the reactive donors were first time donors (30.8%) with a mean age of 27.77±7.181 years. The rest were repeat donors (69.20%) having a mean age of 29.53±7.034 years.

Table II presents the association of different variables with the two groups of reactive donors. Age stratification among reactive donors was statistically important

FIGURE I: PREVALENCE OF TTDS AMONG BLOOD DONORS - A SINGLE CENTER 12 YEAR DATA



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Jan to Jun 2016
Reactive Anti HCV	396	300	322	351	337	336	364	427	424	389	364	356	192
Reactive Anti HIV	4	15	22	19	6	10	16	15	25	16	14	14	11
Reactive HbsAg	224	250	267	278	247	253	245	305	299	302	300	288	122
Reactive VDRL	57	60	72	109	112	99	108	131	120	243	331	292	130
Reactive MP	1	0	0	0	0	0	0	0	0	3	3	2	0

with half of reactive donors (52.4%) belonging to the youngest age bracket of 15-29 years.

Reactive donors grouped on the basis of education status showed a noteworthy association with literacy (p≤0.05) with first time donors mainly educated up to primary level only. Reactive repeat donors were found to be better qualified than their peers (42.6% versus 36.4% in secondary group and 21.2% versus 12% in tertiary group respectively)

First time and repeat donors showed almost equal distribution for HCV, HIV and Malaria infectivity. However the rate was significantly higher among repeat donors for syphilis and among first time donors for Hepatitis B reactivity than their peers.

The results showed that donation status had significant association with age groups, level of education, HbsAg and Syphilis sero-positivity at p≤0.05 level using chi square test considering p≤0.05 as significant. Association with HCV, HIV and malaria infectivity with donation status was statistically insignificant.

TABLE I: DEMOGRAPHIC AND SEROLOGICAL PRESENTATION OF REACTIVE BLOOD DONORS

		n (%)
Age±		29.58±7.11
Education	Primary	754(40.9)
	Secondary	751(40.7)
	Tertiary	339(18.4)
Age Group	15-29 years	967(52.4)
	30-39 years	672(36.4)
	40-49 years	192(10.4)
	≥50 years	13(0.7)
HBsAg	Non reactive	1290(70)
	Reactive	554(30)
Anti-HCV	Non reactive	1128(61.2)
	Reactive	716(38.8)
Anti-HIV1&2	Non reactive	1810(98.2)
	Reactive	34(1.8)
VDRL	Non reactive	1262(68.4)
	Reactive	582(31.6)
Malaria	Non reactive	1842(99.9)
	Reactive	2(0.1)
± Mean±SD		

TABLE II: ASSOCIATION BETWEEN DONATION STATUS AND SERO-MARKERS OF REACTIVE DONORS

Variables	Groups	Donation Status n (%)		p-value
		First Time Donors (n=568)	Repeat Donors (n=1276)	
Age	15-29 years	382(67.3)	585(45.8)	≤0.05
	30-39 years	141(24.8)	531(41.6)	
	40-49 years	42(7.4)	150(11.8)	
	≥50 years	3(0.5)	10(0.8)	
Education	Primary	293(51.6)	461(36.1)	≤0.05
	Secondary	207(36.4)	544(42.6)	
	Tertiary	68(12)	271(21.2)	
HBsAg	Non reactive	349(61.4)	941(73.7)	≤0.05
	Reactive	219(38.6)	335(26.3)	
Anti HCV	Non reactive	335(59)	793(62.1)	0.197*
	Reactive	233(41)	483(37.9)	
Anti-HIV1&2	Non reactive	557(98.1)	1253 (98.2)	0.843*
	Reactive	11(1.9)	23(1.8)	
VDRL	Non reactive	449(79)	813(63.7)	≤0.05
	Reactive	119(21)	463(36.3)	
Malaria	Non reactive	568(100)	1274 (99.8)	1.000*
	Reactive	0(0)	2(0.2)	

Chi Square Test was applied.
p-value ≤0.05 considered as significant.
* Not significant at >0.05 level.

DISCUSSION

The frequency of infections among blood donors is commonly used as a proxy indicator to assess the health status of general population despite biases like extremes of age and female sex especially in developing countries like ours where more than 90% donors are male.

We have observed a static trend of sero-positivity among blood donors since the last few years when compared to the last decade; the only exception being high sero-positivity for Syphilis in the year 2014, probably due to switching to a more sensitive assay based on Chemiluminescent technique (Figure I). Our results show similar pattern of reactivity reported from the same hospital with a marginal decline in HCV and HBV infections even though we switched to Nucleic

Acid Testing (NAT) for HBV, HCV and HIV1and 2 from January 2014. From 2004 to 2011the sero-positivity rates for HBsAg, HCV and HIV were reported as 1.90%, 2.61% and 0.10% respectively[6]. A similar trend of initial rise and stabilization of sero-positivity has been reported from India by Makroo et al[7]. Reported sero-prevalence rates over the last decade from the region including, India, Iran and Nepal are significantly lower as compared to ours [7-9].This reflects a general awareness among their population and efforts made at the national level to control disease spread.

The mean age of reactive donors in our study was 29.58 years. Salamat et al have also reported mean ages of 28.7 and 29.2 years for HBV and HCV sero-positive donors from northern Pakistan[10]. In a country where the median age is 22.2 years, targeting the youth from an early age to motivate and recruit as voluntary donors is vital as this group is potentially large enough to provide sufficient blood to meet patient requirements in Pakistan [11].

Stratification of reactive donors on the basis of age was found to be statistically significant and showed that half the population of new and repeat donors belonged to the youngest age category of 15-29 years. Results similar to our findings have been reported from India and Namibia[7, 12]. However contrary findings were reported from northern regions of Pakistan with lower sero-prevalence of hepatitis markers in replacement donors less than 35 years[13]. The prevalence of TTDs in younger segment of society can have grave consequences as it can lead to a high disease burden in future due to disease transmission.

Current statistics show that in Pakistan the literacy rate is 57.9% [11]. In our study, a significant association between literacy and sero-reactivity among donors was noted which is understandable as education enlightens and creates awareness. Variable results are available in local literature about disease association with education. An earlier study showed a high frequency of HCV among literate repeat donors from interior Sindh province[14]. However in another study conducted on hepatitis B and C patients no significant association of the disease with education was found[15]. Keshvari et al from Iran has reported replacement donations, early age and poor education as significant parameters affecting reactive donors[16].

Although majority of our reactive donors were positive for HCV, this association was insignificant indicating a similar frequency in both groups. In other parts of the world, the prevalence of the TTDs is lower in blood donors than general population, reflecting the health, social status and trend of voluntary donations in those countries. A meta-analysis from Iran based on forty eight studies on blood donors from 1996 to 2011 show their success story in maintaining the lowest rate of HCV infectivity in the region at an average of 0.5% (95% CI: 0.4-0.6%) over 11years[17].

We found a significant association of HBsAg and VDRL reactivity with donation status; the former infection prevalent in first time donors and latter more frequent among repeat donors. Despite the availability of vaccine against Hepatitis B infection, a high rate of exposure among first time donors points towards dearth of awareness and a weak health system. With the induction of vaccination against Hepatitis B in the Extended Program of Immunization since the beginning of millennium it is hoped that the level of Hepatitis B reactivity will be drastically lowered in the coming years as this group will join the donor pool soon. Adversely due to non availability of vaccine protection against HCV, this menace can only be controlled through motivating literate youth for voluntary donations, creating mass awareness about disease transmission and making screening process more stringent.

Since 2010, the Government of Pakistan with the support from the Government of Germany has initiated the blood safety systems reforms which include the formulation of a national blood policy and strategic framework and the establishment of blood transfusion programs at the national and provincial levels. Switching to voluntary non remunerated donors is a major objective of this program[18].It is hoped that with the combined efforts of public and private sector, awareness will be created among the masses to make blood transfusion a safe practice.

CONCLUSION

Blood transfusion is a life-saving procedure, but is fraught with adverse effects like disease transmission; more so in developing countries. A static trend of TTDs with a relative drop in HCV reactivity among blood donors was highlighted by our research, still the study period is too short to make a proper assessment thereby stressing the need of similar researches from other parts of the country. Furthermore, poor education and young age were found to have a direct effect on TTDs prevalence among replacement donors independent of donation frequency. Regular assessment of epidemiology of reactive donors is required to promote education and awareness among the masses. Policies should be devised and implemented for disease prevention as well as to target youth of the country for voluntary donations to ensure blood safety.

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REFERENCES

1. W.H.O[Internet]. Global Database on Blood Safety -World Health Organization; 2011. Available from: http://www.who.int/bloodsafety / global_database / GDBS_Summary_Report_2011.pdf ?ua=1
2. Aggarwal S, Sharma V. Attitudes and problems related to voluntary blood donation in India: A short communication. Ann Trop Med Public Health 2012; 5(1):50-52.
3. W.H.O[Internet]. Blood safety and availability-Factsheet; 2016. Available from: http://www.who.int/mediacentre/factsheets/fs279/en/
4. Mujtaba G, Jahan S, Khaliq S, Mahmood N, Javed FT, Choudhry N, et al. Current Status of Transmission Risk Factors and Genotypes of Hepatitis C Virus, In Punjabi Population of Pakistan. IJAVMS. 2011; 5(2): 271-282.
5. Qureshi H, Bile KM, Jooma R, Alam SE, Afridi HU. Prevalence of hepatitis B and C viral infections in Pakistan: findings of a national survey appealing for effective prevention and control measures. East Mediterr Health J. 2010; 16Suppl: S15-23.
6. Irfan SM, Uddin J, Zaheer HA, Sultan S, Baig A. Trends in transfusion transmitted infections among replacement blood donors in Karachi, Pakistan. Turk J Haematol. 2013; 30(2):163-7.
7. Makroo RN, Walia RS, Chowdhry M, Bhatia A, Hegde V, Rosamma NL. Seroprevalence of anti-HCV antibodies among blood donors of north India. Indian J Med Res. 2013; 138: 125–8.
8. Mohammadali F, Pourfathollah AA. Changes in frequency of HBV, HCV, HIV and Syphilis infections among blood donors in Tehran province 2005 - 2011. Arch Iran Med. 2014; 17(9):613-20.
9. Rai S, Dongol P, Khanal H. Seroprevalence of Hepatitis B and Hepatitis C among blood donors at Dharan, Sunsari, Nepal. Sunsari Technical College Journal 2015; 2(1): 13-16.
10. Salamat N. Effectiveness of blood donor questionnaire directed at risk factor for transfusion transmitted infections in Pakistani population. Asian J Transfus Sci. 2012; 6(2): 169–73.
11. Central Intelligence Agency[Internet]. The World Fact Book; 2016. Available from: https://www.cia.gov/library/publications/the-world-factbook/geos/pk.html.
12. Mavenyengwa RT, Mukesi M, Chipare I, Shoombe E. Prevalence of human immunodeficiency virus, syphilis, hepatitis B and C in blood donations in Namibia. BMC Public Health 2014, 14:424. doi: 10.1186/1471-2458-14-424.
13. Sultan F, Mehmood T, Mahmood MT. Infectious Pathogens in volunteer and replacement blood donors in Pakistan: a ten year experience. Intern J Infect Dis. 2007; 11(5):407–412.
14. Mujeeb SA, Pearce MS. Temporal trends in hepatitis B and C infection in family blood donors from interior Sindh, Pakistan.BMC Infect Dis. 2008;8: 43.
15. Shafiq M, Nadeem M, Sattar Z, et al. Identification of risk factors for hepatitis B and C in Peshawar, Pakistan.HIV AIDS (Auckl). 2015; 7: 223–31.
16. Keshvari M, Sharafi H, Alavian SM, et al. Prevalence and trends of transfusion-transmitted infections among blood donors in Tehran, Iran from 2008 to 2013.Transfus Apher Sci. 2015;53(1):38-47.
17. Khudabandehloo M, Roshani D, Sayehmiri K. Prevalence and trend of hepatitis C virus infection among blood donors in Iran: A systematic review and meta-analysis. J Res Med Sci. 2013; 18(8): 674–82.
18. Zaheer HA, Waheed U. Blood safety system reforms in Pakistan. Blood Transfus. 2014; 12(4): 452–57.

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