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Research Article

**TRENDS AND FREQUENCY OF TRANSFUSION  
TRANSMISSIBLE INFECTIONS AMONG VOLUNTARY  
BLOOD DONORS AT PESHAWAR, KHYBER  
PAKHTUNKHWA, PAKISTAN**

<sup>1</sup>Mr. Faiz Ullah, <sup>2</sup>Mr. Muhammad Asif Zeb, <sup>3</sup>Mr. Zubair Hussain, <sup>4</sup>Mr. Aman Ullah and  
<sup>5</sup>Mr. Anees Muhammad  
Khyber Medical University [IPMS-KMU], Peshawar<sup>1,2,3,4,5</sup>

**Abstract:**

**Back ground:** Today blood transfusion is safer than ever. Although still it carries potential risk of transmitting TTIs due to certain hurdles like window phase of infections and low sensitive testing approaches. TTIs are caused by different viral, bacteria and parasitic agents. Of these agents HBV, HCV, HIV, T.Pallidum and malaria are of great clinical significance. Pakistan is facing the problem of having high prevalence of TTIs. Here blood and its components transfusion caused known cases of HIV, HBV, HCV, T. Pallidum and Malarial Parasites infections.

**Objective:** To determine the trends and frequency of TTIs among voluntary blood donors at Hamza Foundation Welfare Hospital and Blood Services, Peshawar, Khyber Pakhtunkhwa.

**Methodology:** In this retrospective cross-sectional study a total of 84078 voluntary blood donors' records were observed for TTIs from 12<sup>th</sup> July 2006 to 31<sup>st</sup> August 2017. Convenient sampling method was used and all voluntary blood donors with complete records were included in the study. This study was carried out at Hamza Foundation Welfare Hospital and Blood Services, Peshawar, Khyber Pakhtunkhwa.

**Results:** In the study period 2239 [2.66%] donors were found seropositive for TTIs. Of all the donors, 81839 [97.34%] were found seronegative for TTIs. Among TTIs HBV, HCV, HIV, Syphilis and Malarial infections had a prevalence of 1.67%, 0.6%, 0.02%, 0.32% and 0.06% respectively.

**Conclusion:** The frequency of TTIs is low in contrast to other studies in the region having replacement donors, still it is alarming. Syphilis shows an upward trend in prevalence making it a risk for transfusion. HBV and HCV show a declining trend which is a good sign.

**Key words:** TTIs, HBV, HCV, HIV, Syphilis, Malaria, Voluntary blood donors.

**Corresponding author:****Mr. Faiz Ullah**

Khyber Medical University [IPMS-KMU], Peshawar

Email Address: [faizu4875@gmail.com](mailto:faizu4875@gmail.com)

QR code



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## INTRODUCTION:

Today blood transfusion is safer than ever. Although still it carries potential risk of transmitting transfusion transmissible infections [TTIs] due to certain hurdles like window phase of infectious agents and low sensitive testing approaches [1]. TTIs are caused by different viral, bacterial and parasitic agents [1]. Of these agents Hepatitis B virus [HBV], Hepatitis C virus [HCV], Human immune deficiency virus [HIV], *T.Pallidum* and malaria are of great clinical significance. Blood and blood components transfusion is required mostly in serious health related outcomes including thalassemia, hemophilia and major surgeries [2]. Although it is a lifesaving procedure but is also associated with potential risk of transmitting these infections [3]. Safe blood transfusion is a demand of effective health care system. Therefore, voluntary blood donor would be a step to provide safe blood to the health care system.

Currently in the Europe and the USA TTIs are not major alarms. As implementation of highly sensitive methods for testing like NAT, strict donor selection criteria and avoiding donation from high risk groups [4]. In USA the residual risk of HCV and HIV is below a case per million and that of HBV is about 1/300000 [5].

While in developing countries TTIs pose serious threats to blood safety. Pakistan is facing the same problem having high prevalence of TTIs. In Pakistan blood and its components transfusion caused known cases of HIV, HBV, HCV, *T. Pallidum* and Malarial Parasites infections [6]. This is because of lack of resources, low sensitivity of testing devices and reagents, window phase of these infectious diseases, funding requirements, lack of well trained staff, silent carriers and the errors in the laboratory environment [7].

According to the information provided by 164 countries globally to the WHO, 92 million blood donations are received of which 1.6 million are rejected due to infectious indicators [3]. For blood safety purpose the WHO force to screen all blood and its components for TTIs prior to release for clinical use. WHO put it is mandatory to screen blood donations for HIV, HBV, HCV and Syphilis [8]. A reduction in TTIs has occurred where routine screening of blood is done [9].

Since transfusion therapy is an important field of medicine now, it is used globally but different countries use different strategies to reduce the risk of TTIs. In this mentioned context wealthy countries have reduced the risk to a significant level by applying

best resources in the world as they cost much like NAT. Also the voluntary blood donations and strict deferral criteria added much to low TTIs prevalence in these countries. TTIs in USA are in decimal now of which HCV is the most prevalent with a frequency of 0.033% [5]. This prevalence is even lower than that of HIV in Pakistan, this is far to achieve this success in our country. When it comes to developing countries it needs improvement to overcome TTIs burden. Iran had a TTIs prevalence of 0.15%, 0.1% and 0.004% for HBV, HCV and HIV respectively [10]. A study from Saudi Arabia reported 3.8% and 0.4% prevalence for HBV and HCV respectively [11]. The figures for China were 0.87%, 0.86%, 0.31% and 0.7% for HBV, HCV, HIV and Syphilis in blood donors respectively [8]. In Pakistan the prevalence of TTIs ranges from 1.48 to 2.68% for HCV [12,13], 1.7 to 7.69% for HBV [14,15], 0.02 to 0.11% for HIV [6,12], 0.43 to 2.08% for syphilis [6,13] and up to 0.39% [6] for Malaria.

In Pakistan very scanty data is available for TTIs in voluntary blood donors. Most of the studies in Pakistan looked for the prevalence in replacement blood donors [15]. Also this study provides information on large sized scale. The comparative analysis of data shows the trends and variation of TTIs in the study duration. Therefore the Purpose of the study was to find prevalence of TTIs in voluntary blood donors at Hamza Foundation Welfare Hospital and Blood Services, Peshawar, Khyber Pakhtunkhwa and to find variations and trends of these infections.

## MATERIALS AND METHODS:

This is a retrospective cross-sectional study was carried out on voluntary blood donors who donated blood to Hamza Foundation Welfare Hospital and Blood Services, Peshawar from 12<sup>th</sup> July 2006 to 31<sup>st</sup> August 2017. Permission was granted from the Head of the department. A total of 84078 volunteer blood donors were included in the study. All the technical work including blood collection and screening was done by Hamza foundation. We collected results from foundation record. Volunteer blood donors who fulfill the donor selection criteria were included in this study. Those donors who have any chronic disease were excluded. The donor's age were range from 18 to 55 years and were fit both mentally and physically. Furthermore, the hemoglobin was not less than 13 mg/dl for male and for females the hemoglobin was not less than 12.5mg/dl. The donors were checked by medical superintendent at Humza foundation. The donors were registered with an identification number. Blood was collected in bags having anticoagulant CPDA-1. From donors 3ml and 5ml blood was taken in purple top and red top vacutainers respectively. The

tubes and bags were labeled with respective donor ID. From EDTA blood malarial parasite identification was done through ICT while the red top vacutainer were centrifuged to separate serum. For HBV, HCV and HIV detection 3<sup>rd</sup> generation ELISA was used for screening while syphilis and malaria was detected using immune chromatography technique. Informed consent was taken from all the donors. This study was approved from the ethical committee of undergraduate research committee at Institute of Paramedical Science at Khyber Medical University, Peshawar. Data were entered in SPSS version 21. Significance of trend and the variations among years was calculated using chi-square test [11,16]. Graphs were made in Microsoft Excel 2010.

### RESULTS:

In the current study a total of 84078 voluntary blood donors were included. Figure 3.1 shows the year-wise registered donors. All of them were voluntary, non-remunerated blood donors. Of them the preponderant donors 83,996 [99.9%] were males while only 82 [0.1%] were females. All of the females were found seronegative for TTIs. A total of 2239 [2.66%] donors were found seropositive for TTIs while 81839 [97.34%] were found seronegative. The highest prevalence was found to be 3.12% in 2011 while the lowest was 1.91% in 2010. Among TTIs HBV, HCV, HIV, Syphilis and Malarial infections had a prevalence of 1.67%, 0.6%, 0.02%, 0.32% and 0.06% respectively. The most frequent TTI was HBV contributing to 62.7% of all cases. HIV was the least frequent infection [0.6%] in all cases. Simultaneous

infection with more than one agent was noted only in case of HBV and HCV concurrently. Only 65 [0.08%] such cases were found [Table 3.1]. Figure 3.2 shows the trends in frequency of TTIs during the study duration.

HBV infection was the most frequent among TTIs. The overall prevalence was 1.67%. Year 2006 showed the lowest prevalence of 1% while the highest was 2.1% in 2008. HBV varied significantly [P value= 0.001]. HBV slightly declined after 2011.

HCV infection stood the 2<sup>nd</sup> most frequent TTI after HBV. The seropositivity of HCV was 0.6%. HCV significantly showed a declining trend after 2008. 2006 was the year of highest prevalence for HCV [0.89%] while 2012 showed the lowest prevalence [0.44%].

HIV infection was the least frequent TTI. HIV non-significantly showed variations in the current study. Four of study years went blank for HIV infection. The frequency of HIV was 0.02%.

Syphilis was the frequent TTI after HBV and HCV. It showed a prevalence of 0.32% in 84078 donors. Syphilis showed an increasing trend after 2010 significantly.

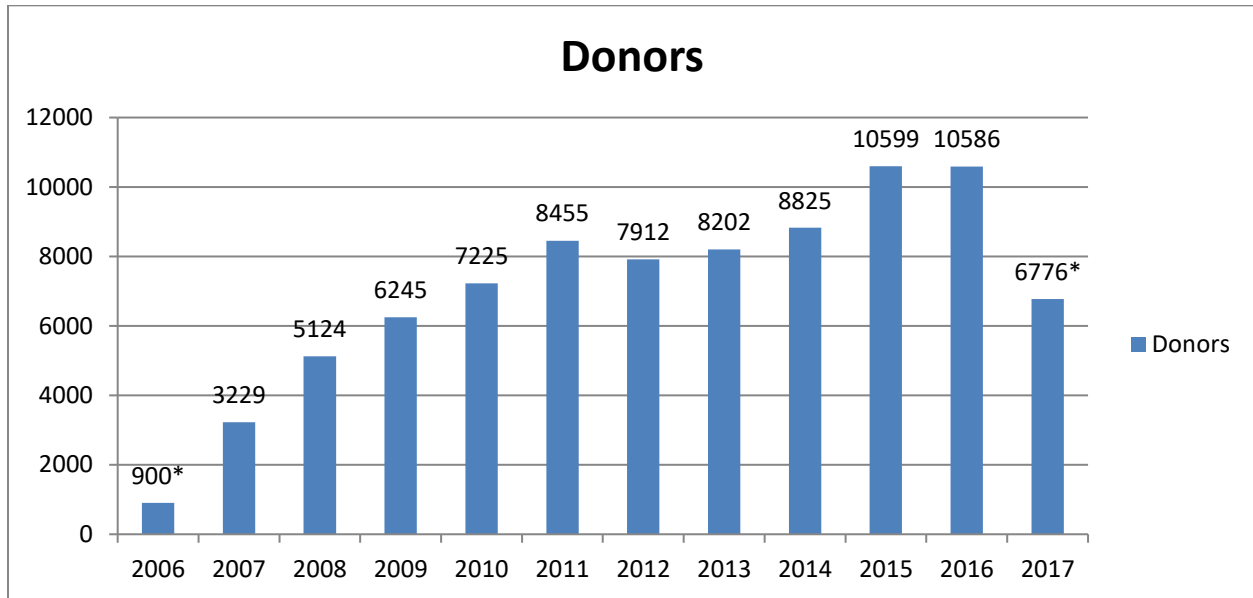
Malaria was the 2<sup>nd</sup> least frequent infection in this study after HIV. The prevalence of malaria was 0.06%. Malaria showed non-significant variations in this study.

**Table.1. Frequency of TTIs and donor's distribution in the study duration**

Year	N of donors	Frequency											
		TTIs		HBV		HCV		HIV		Syphilis		Malaria	
		N	[%]	N	[%]	N	[%]	N	[%]	N	[%]	N	[%]
2006	900	20	[2.22]	9	[1.0]	8	[0.89]	0	[00]	2	[0.22]	1	[0.11]
2007	3229	79	[2.45]	45	[1.39]	26	[0.80]	1	[0.03]	6	[0.19]	1	[0.03]
2008	5124	159	[3.10]	108	[2.10]	36	[0.70]	1	[0.02]	11	[0.21]	3	[0.05]
2009	6245	151	[2.45]	98	[1.57]	37	[0.59]	0	[00]	12	[0.19]	4	[0.06]
2010	7225	138	[1.91]	80	[1.10]	35	[0.48]	2	[0.03]	15	[0.20]	6	[0.08]
2011	8455	264	[3.12]	169	[2.00]	59	[0.70]	1	[0.01]	28	[0.33]	7	[0.08]
2012	7912	207	[2.62]	147	[1.90]	35	[0.44]	0	[00]	20	[0.25]	5	[0.06]
2013	8202	245	[2.99]	142	[1.73]	65	[0.80]	0	[00]	34	[0.41]	4	[0.05]
2014	8825	233	[2.64]	132	[1.49]	56	[0.63]	2	[0.02]	38	[0.43]	5	[0.06]
2015	10599	299	[2.82]	192	[1.81]	62	[0.58]	1	[0.01]	42	[0.40]	2	[0.01]
2016	10586	279	[2.64]	181	[1.71]	52	[0.49]	3	[0.03]	34	[0.32]	9	[0.09]
2017	6776	165	[2.44]	100	[1.48]	32	[0.47]	2	[0.03]	27	[0.40]	4	[0.06]
P-value*		0.0002		0.0001		0.04		0.75		0.04		0.84	
Total	84078	2239[2.66]		1403 [1.67]		503 [0.60]		13 [0.02]		269 [0.32]		51 [0.06]	

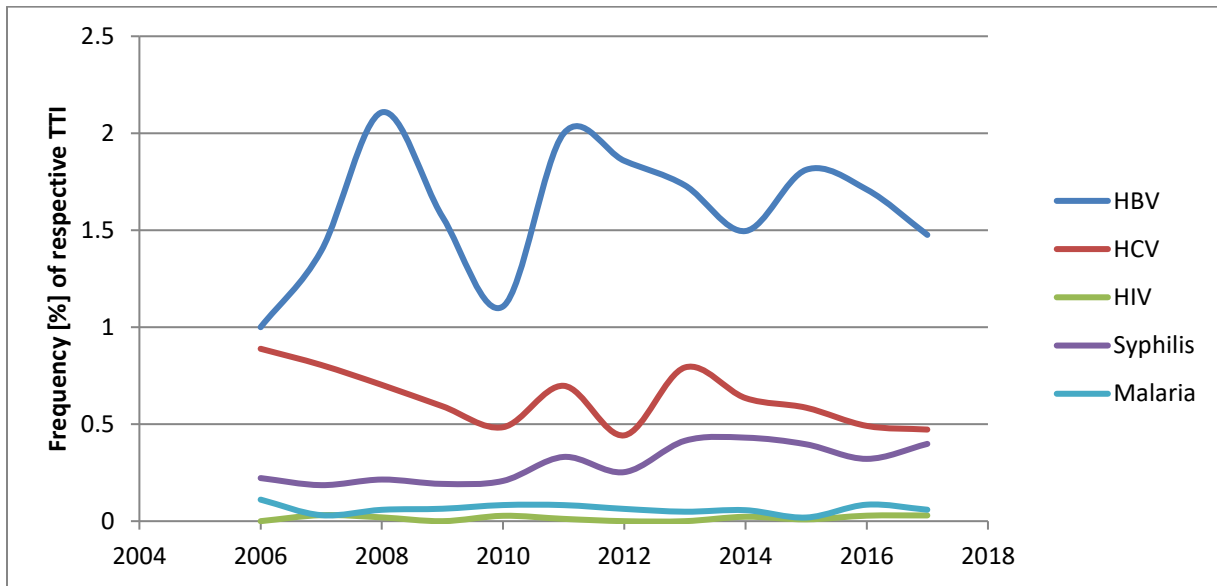
\*P- value Of less than 0.05 was set as significant, N= absolute number, %= frequency

Figure 3.1. Year-wise donors distribution



\* These years are not complete years, 2006 indicates from 12<sup>th</sup> July onward while 2017 indicates from 1<sup>st</sup> Jan - 31<sup>st</sup> August

Figure 3.2. Trends of TTIs during study duration



**DISCUSSION:**

The frequency for TTIs was found to be 2.66% while that for HBV, HCV, HIV, Syphilis and Malaria was 1.67%, 0.6%, 0.02%, 0.32% and 0.06% respectively.

Current study focused on voluntary blood donors in contrast to other studies at Peshawar[15,17]. Females contributed to be only 0.09% [n=82] which favors the trend in other studies in Pakistan [13]. This is very alarming situation in Pakistan and is mainly due to

social constraints. In developed countries females put in nearly equal part to males in blood donation [5].

Except for HBV nearly all the studies in Pakistan showed an increased prevalence of TTIs comparatively to this study. Regarding HBV, current results are similar to Zameer et al.[6], Manzoor et al. [10], Niazi et al.[12], Ali shah et al.[18], and Umair et al [19]. These similar results did not take the type of donor [voluntary, replacement etc] into account. This may be because of the vaccination programs in the country and public awareness regarding hepatitis [20]. Therefore, whether they were voluntary or replacement donors, all of them showed nearly similar results. This aforementioned trend and rationale was not followed by Atta Ullah et al. [13] in which the prevalence of HBV was higher than current study. That study was conducted at Lady Reading Hospital [LRH] where most of the patients are very poor and most of blood donors are replacement. HCV, HIV, Syphilis and malarial infection status is low in comparison to Zameer et al. [6], Arshad et al. [15], Atta Ullah et al. [13]. This may be due to the large volume of replacement blood donors in the studies.

Syphilis increased significantly after 2010. It is an emerging sexual transmitted infection [STI]and has been reported to be the most prevalent STI in the region [21]. HCV showed a declining trend after 2008 and HCV after 2011. This may be due to awareness about hazards associated with reuse of syringes and barber instruments. Good medical practices like screening of patients prior to surgery or dental procedures [20].

HBV was found more frequent than HCV. Ratio of their infection was 1: 0.35. Route of transmission is almost the same but; HBV has an advantage because of availability of vaccine. It may be due to the fact that HBV is the more infectious than HCV causing more damage than HCV [22].

Voluntary blood donors are found to be more safer than replacement donors compared to other studies in the region[13, 6]. They are safer because of their young age and being educated. These factors compel them to donate blood for the betterment of patients and are also aware of the risks of transmission of TTIs [23].

The screening tool used was ELISA forHBsAg, anti-HCV and anti-HIV, although it is a sensitive method but PCR was not used due to its expensive nature. Syphilis and Malaria was done by ICT. Females were very low in current study due to social constraints.

Socio-economic analysis was not done because of its non-availability in the records.

Although the prevalence of TTIs is low in contrast to other studies in the region having replacement donors, still it is alarming. Syphilis shows the upward trend in prevalence thus making it a risk for transfusion. HBV and HCV are declining which is a good sign.

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