Seroprevalence of HBV, HCV, HIV, Syphilis and Malarial Parasite in Apparently Healthy Blood Donors from Faisalabad

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Background:

Transfusion transmissible infections is a gigantic problem responsible for huge number of deaths worldwide. It is more common in developing countries including Pakistan due to less attention toward these infections. These infections are associated with prolonged hospital stay, loss of economy and high mortality rate. Among Transfusion transmissible infection HCV, HBV, HIV and M.P

Objective

To analyze diseases like HCV, HBV, HIV, syphilis and M.P. among apparently healthy blood donors.

Method:

The study was conducted among apparently healthy blood donors at blood bank of Mujahid hospital Faisalabad from January 2019 to August 2019. Data was collected with permission from blood bank of Mujahid hospital Faisalabad. Immuno chromatographic technique (ICT) was used for screening.

Results

Out of 1388 apparently healthy blood donors, 1333 (96.03%) were healthy blood donors and 55(3.97%) were infected. The overall prevalence of anti-HCV, HBV, HIV, syphilis and Malaria parasite was 23 (1.7%), 13 (0.9%), 01 (0.1%), 17 (1.2%) and 01 (0.1%) respectively. In this study high prevalence of HCV was detected followed by Syphilis, HBV, HIV and M.P.

Conclusion
Hepatitis C and Syphilis is more common among blood donors of Faisalabad. HIV is a rare disease in blood donors of our area. It is due to poor attention toward blood transfusion method and techniques are also poor. It is needed to create awareness among blood donor about blood transfusion diseases and also required to improve blood transfusion techniques.

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Introduction

Blood bank is the most expeditious arm of Medical Science these days and it has supreme role to uphold Blood and Blood supplies. It is used to save blood components and Blood supplies for transfusion[1]Blood transfusion is considered life savior therapy from years that has transmute medicine. Blood is highly demanding component in surgical and medical treatment.[2] Blood transfusion rate in Pakistan is 1.5 million bags annually. In Pakistan blood donation rate is less than 1% and this rate is not enough for country's need. In Pakistan 10-20% blood supply is donated by professional donor and 40% is demanded from public sector. If 1% population of Pakistan donate blood, it will be sufficient for country's needs. At this stage Shortage amount of blood is 40%. There are almost 150 public and 450 private blood banks in Pakistan [3] Blood transfusion is linked with certain threats, which can cause serious issues [2] Transfusion transmissible infections (TTIs) like hepatitis B virus (HBV), Hepatitis C virus (HCV), Human immunodeficiency virus (HIV), Malaria parasite (MP) and Treponema pallidum (TP) can transport to recipient blood from effected donor's blood through blood transfusion [4]. In developing countries, virulent agents like HCV, HBV, HIV, M.P and T.P draw huge attention due to high prevalence among population. Pakistan has high burden of TTIs like HCV, HBV, HIV, M.P and T.P [2] In 2015 World Health Organization (WHO) reported 3.5% (257 million people) HBV infected people in general population worldwide. World health organization (WHO) reported that globally 1% population (71 million people) is living with HCV infection [5]. At the end of 2018 world health Organization (WHO) found 37.9 million HIV infected people globally [6].

In 2014 GARPR (Global Aids Response Progress reports) reported that 25.1 syphilis cases was seen, per 100,000 young adult population of 55 countries [7]. In 2017 World health organization (WHO) reported 219 million cases of malaria among 87 countries. It was also reported that almost 435,000 deaths occur due to malaria in 2017 [8].The Centre for Disease Control and Prevention (CDC) of united State reported that HBV is 10 and 100 times more infectious than HCV and HIV. It is reported that HCV, HBV and HIV ratio in Pakistan is almost 9 million, 10 million and 97000-125000 individuals respectively. In Pakistan Plasmodium vivax and Plasmodium falciparum are most common type of malaria. P.vivax was most common among population of Pakistan from 60's to early 80's but P. falciparum is most

common now [9, 10]. Pakistan has 188 million individuals of which 177 million people are at risk of malaria and annually 3.5 million confirmed cases of malaria has been seen [11].

Almost 81 million units of blood is donated every year worldwide and it was found that more than 18 million people are not screened properly for TTIs [12].03 million units of blood is donated every year in Pakistan and every blood unit has 1% probability of obtaining transfusion-associated problems including TTIs.[13, 14] World Health organization (WHO) demonstrate that non-infectious and poor blood is universal right. So all donated should be screened properly and carefully [12]Pakistan is facing continually increasing demand of blood transfusion mostly for thalassemia, hemodialysis and hemophilia patient and in road accident. Thalassemia is more prevalent in Pakistan and almost 5000 children born with thalassemia each year and 70,000 patients noted with this disease [3]Almost 100,000 patient with thalassemia are dependent on blood transfusion and they are at high risk of developing TTIs in Pakistan and this can limit their life expectancy [15]. If donor or donated blood is not screened properly then these carries are serious threats to population [14].

Blood transfusion facilities in Pakistan is very poor and there is a huge difference between standard services provide by the different blood transfusion centers and World Health Organization (WHO) mentioned standard services [13]. There are few blood transfusion centers who follow WHO mentioned guidelines but overall there is huge need to upgrade efficiency of blood transfusion centers. Globally TTI is decreased due to awareness among blood transfusion centers and community. But TTI prevalence is high in Pakistan but nationally progress is also made with time [16]. TTI transmission is common due to poor efficiency of blood transfusion centers and today's main concern is to control TTI in Pakistan [17]. Major cause of TTI is untrained staff for screening and detection, inability to disease 'window phase', high cost of tests, expired screening kits, immunologically different serotypes, non-serious behavior towards detection and unintentional laboratory errors.

Immuno-chromatography technique (ICT) is used for detection because it time saving, more simple and rapid and easily observable. It is qualitative membrane based method and can detect antibodies or antigens present in serum or plasma of blood within no time and results are shown as color development on ICT kits.

TTI analysis among blood donors assist us to lower risks of TTI in community. This analysis will help to control TTI and long term policies to improve public health. Current study was planned to analyze frequency of TTI among healthy blood donors.

Material and Method

A data analysis study of blood donor data from January 2019 to August 2019 was conducted in Blood bank/ Mujahid Hospital Faisalabad. The age of donors was between 17-60 years and weight was not less than 50 kg. Within our study period 1388 apparently healthy blood donor were tested for HBsAg, HCV, HIV, Malaria parasite (M.P) and Syphilis (VDRL). Tests were performed using commercially available test devices according to the instructions of

manufacturer. HCV and HBsAg screening were done using serum/plasma rapid immunochromatographic test devices developed by ABON Biopharm (Hangzhou) Co. limited. HIV report of the donors were determined using two rapid HIV test methods; determine HIV ½ screening was done using whole blood/serum/plasma rapid immunochromatographic test devices developed by ABON Biopharm (Hangzhou) Co. limited. Test was performed using instructions of the manufacturer. Whole blood from all blood donors were tested for the presence of Malaria parasite antigens using ACON rapid immunochromatographic Malaria P.f/Pan (ACON Laboratories, Inc., San Diego, CA, USA) test devices, following manufacturer's instructions. Serum/Plasma from blood of all blood donors was tested for the presence of Treponema pallidium antibodies using ABON rapid immunochromatographic VDRL test devices developed by ABON Biopharm (Hangzhou) Co. limited. Test was done by following the instructions of the manufacturer.

Results

The overall number of intended blood donors screened for donation from January 2019 to August 2019 was 1388 including 1383 (99.6%) males and 5 (0.4%) females. Out of 1388 blood donors 1333 (96.03%) were healthy blood donors and 55 (3.97%) were infected. Out of 1388 (99.6%) males 23 (1.7%) were positive for HCV infection and out of 5 (0.4%) females, no individual (0%) was positive for HCV. 13 blood donor males (0.9%) were positive for HBV infection and no female (0%) was positive for HBV. HIV infection was found among 1 male (0.1%) and no female (0%) was positive for HIV infection. 17 (1.2%) males were infected with syphilis and no female (0%) was infected with Syphilis (VDRL). 01 (0.1%) individual has Malarial infection and no female (0%) was infected with Malaria parasite. The percentage prevalence of transfusion transmissible infection during the study interval was 55 (3.96%) while percentage prevalence of HCV, HBV, HIV, and Syphilis & M.P infected blood donors were 1.7, 0.9, 0.1, 1.2 & 0.1% respectively.

Table 1: Overview of selected diseases in selected population

HCV	Frequency (f)	Percent (%)	Valid percent (%)	Cumulative percent (%)
Positive	23	1.7	1.7	1.7
Negative	1365	98.3	98.3	100.0
Total	1388	100.0	100.0	
HBV				
Positive	13	0.9	0.9	0.9
Negative	1365	99.1	99.1	100
Total	1388	100	100	
HIV				
Positive	01	0.1	0.1	0.1

Negative	1387	99.9	99.9	100.0
Total	1388	100.0	100.0	
Syphilis				
Positive	17	1.2	1.2	1.2
Negative	1371	98.8	98.2	100.0
Total	1388	100.0	100.0	
Malaria				
Positive	01	0.1	0.1	0.1
Negative	1387	99.9	99.9	100.0
Total	1388	100.0	100.0	

Overall Irregular fluctuation has seen of all TTI in blood donors in study 8 month.Within study, it was observed that TTI –positive ratio has been decreased with decreasing the prevalence of HCV, HBV, HIV, Syphilis and M.P among blood donors.

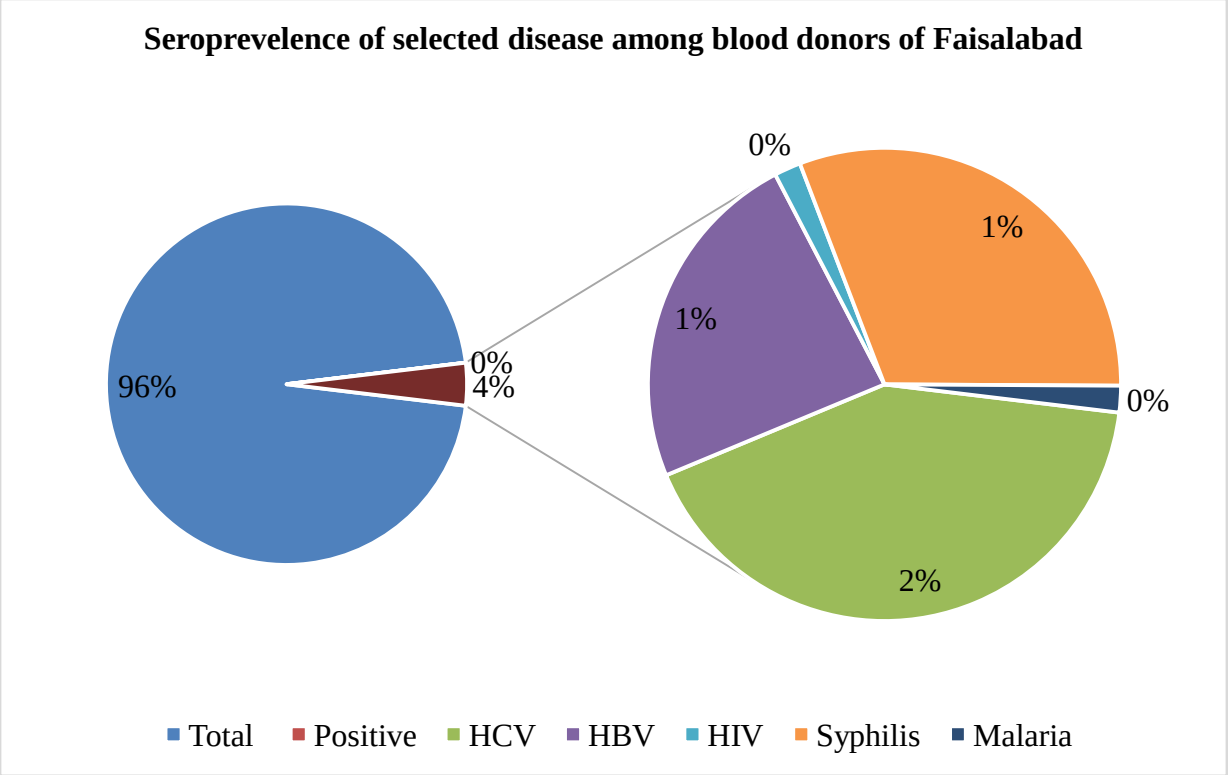

Fig. 1. Seroprevalence of HBV, HCV, HIV, Syphilis and Malaria Parasite in healthy Blood Donors

Discussion

Blood transfusion is main route of transfusion transmissible infection [18]. Department of transfusion medicine screened the blood and find out the ratio of transfusion-transmissible infection [18]. In multiple researches it was observed that HCV and HBV ratio in general

population is higher than blood donors and studies conducted among blood donors does not indicate the prevalence of HCV and HBV among general population [19]. All Blood donor are healthy and age ratio is up-to 17 years old and weight is counted up-to 50kg. So they indicate the asymptomatic carrier of infection in the community at large level [20].

Blood screening test before blood transfusion, was introduced by National blood transfusion policy first time in 2003 in Pakistan. In the past ratio of transmission of Hepatitis via blood transfusion was high due to inappropriate blood screening tests in Pakistan. Before administration of blood screening test procedure it was observed that multiple studies of hepatitis patients show that infection was transmitted through blood transfusion. It is estimated that 117.4 million units of blood is collected every year worldwide. 42% of this donated blood is collected in high-income countries [21].

It is estimated that annually blood transfusion rate in Pakistan is 1.2-1.5 million units of blood.[22] According to 2008-2015 survey report of world health organization, it was reported that 11.6 million units of blood is donated by voluntary unpaid blood donors. It is observed that ratio of voluntarily blood donators is high. According to WHO survey report of 78 countries, it was reported that over 90% of donated blood was collected from voluntary unpaid blood donors. However, WHO survey report of 58 countries show that 50% of the collected blood is came from family/replacement or paid blood donors [23].

In Pakistan, donation of blood by females is low because Pakistan is an Islamic country and it does not feel comfortable that a female donate blood in Islamic country. Due to many other reasons females are also not considered suitable for blood transfusion. They have menstruation cycle of one week every month, that's why they are considered weak and not suitable for blood donation.

In low-income countries 52% of all blood transfusion is given to children lower than 5 years of age. While in high-income countries up-to 75% of all blood transfusion is given to old age patients over 65 years [23]. TTI is more common in paid blood donors. A number of countries have law regarding paid blood donors. Chinese government watch out to paid blood donors and they banned it in 1998. It was resulted in lowness of HCV in China. 8.68% HCV prevalence was present in 1990 in China but after applying ban on paid blood donors it reduced to 3.2% in 2010 [24]

In 1998 India also put a law to ban paid blood donation. It was resulted in lowness of HCV, HBV, and HIV among Indian blood donors. HCV, HBV, and HIV prevalence among blood donors was 1.85%, 1.62% and 1.16% respectively in 2004 but after putting the law among blood donors, it reduced to 0.52%, 0.92% and 0.21 respectively in 2009[15]. In Iran prevalence of HCV, HBV and HIV was 0.14%, 0.71% and 0.0033% respectively in 2003, but after 2 years in 2005 it decreased to 0.023%, 0.48% and 0.0031% respectively. It was found a great change from 2003-2005 in Iran.

TTI prevalence varies from country to country, community to community and environment to environment. In our study we recorded the overall prevalence of various transfusion transmissible

from the duration of January 2019 to August 2019 in intended blood donors of Mujahid hospital Faisalabad's blood bank. Within this study, out of 1388 blood donors, we found 96.04% (n=1333) healthy and 3.96% (n=55) intended blood donors positive for transfusion transmissible infections. Lower frequency of TTI was observed among blood donors. It was observed that awareness and knowledge of TTI among population has been increased due to that TTI ratio is decreasing day by day, population to population and area to area. Low TTI prevalence has been seen globally due to awareness, improvement, knowledge and control of sexually transmitted infections [25].

https://www.who.int/reproductivehealth/publications/rtis/stis-surveillance-2015/en/

HCV infection was most common 1.7% (n=23), followed by 1.2% (n=17) syphilis, 0.9% (n=13), 0.1% (n=1) and 0.1% (n=1) HIV and M.P respectively among blood donors of study. Prevalence of HIV and M.P was reported 0.1% lowest prevalent and HCV was reported 1.7% highest prevalent infection during the period of study.

Result of present study is almost equal to recent studies conducted in different cities of Pakistan. Few studies mentioned in the table show little high prevalence of HCV or HBV. But most of studies show almost same prevalence of HCV and HBV as compared to present study. Prevalence of HCV and HBV can be little different in studies due to sample size, area of study, environment where study conducted and knowledge and awareness of HCV and HBV infection among blood donors.

8-10% prevalence of HCV and HBV was reported from different parts of the country by Hakeem et al [26]. But with the passing of time decreased prevalence of HBV infection observed on large-scale within country due to HBV vaccine launched against HBV infection in community. No vaccine yet discovered for HCV infection, due to that HCV infection has increased among population.[26] Farooqi et al. observed that HCV and HBV prevalence was 3.21% and 2.54% respectively among 166,189 blood donors from 2001-2006[27].

Multiple studies conducted among blood donors of different cities of Pakistan show average prevalence of HCV and HBV Infection in blood donors. Like studies conducted in Lahore show 1.5-3.3% HBV prevalence and 4.1-5.3% HCV prevalence among blood donors [28, 29]. Studies conducted among blood donors of Karachi city show HCV prevalence range from 2.0%-4.3% and HBV prevalence range from 1.7%-4.5% [30, 31]. Some studies conducted among blood donors of Rawalpindi city found that HCV ratio is 2.5-6.2% and HBV ratio is 2.4-5.8% present among blood donors [32, 33].

Similarly multiple studies conducted recently among blood donors of different cities of Pakistan show average HCV and HBV prevalence. Arshad et al. , Nazar et al. and Azam et al. found 1.7% and 1.84%, 2.06% and 1.71%, 4.36% and 4.50% HCV and HBV prevalence respectively among blood donors of Karachi city[30, 31, 34]. Zameer et al. , Saeed et al. , Manzoor et al. and sultan et al. found 3.75% and 1.59%, 2.62% and 1.10%, 7.69% and 1.70%, 3.68% and 2.22% HCV and HBV prevalence respectively among blood donors of Lahore city[14, 28, 35, 36]. Hussain et al. found 3.44% and 2.32%, HCV and HBV prevalence respectively among blood

donors of Multan city[37]. Niazi et al. and Chaudhary et al. found 2.6% and 1.48%, 2.52% and 2.45% HCV and HBV prevalence respectively among blood donor of Rawalpindi city[33, 38]. Khan et al. found 1.80% and 4.80% HCV and HBV prevalence respectively among blood donors of Quetta city[39]. Aziz et al. found 1.10% and 8.40% HCV and HBV prevalence respectively among blood donors of Skardu city[39].

Syphilis was disappeared from Pakistan but now it reappear in population. Increased prevalence of Syphilis appeared in blood donor studies rather than general population of Pakistan is a critical situation. In current study ratio of Syphilis was 1.2%. While a study conducted by Saeed et al. at Lahore among blood donors found 1.55% syphilis prevalence [14]. In another study conducted among blood donors of Islamabad found 0.89% syphilis prevalence [40]. In a study conducted among blood donors of Australia show 0.34% prevalence of syphilis [41]. It shows that Syphilis is present in blood donors of different countries in average range. Manzoor et al. found 0.5% syphilis prevalence among blood donors using VDRL (venereal disease research laboratory) test [35]. Diagnostic technique used by Manzoor et al. was different as compared to our study because we used ICT method to detect Anti-TP antibodies and that studied was based on VDRL test.

It was observed that present study show lowest prevalence 0.1% and 0.1% of M.P and HIV respectively among blood donor. Prevalence of HIV and M.P in Saeed et al. study, was almost similar to present study. Another study conducted among blood donors of Albanian show HIV prevalence almost similar to Saeed et al. and present study [42]. While it was observed that in a study conducted among blood donors of India have high prevalence (0.23%) of HIV [41].

Malaria parasite is the most common parasite that can transmitted through blood transfusion. Study conducted at Lahore among blood donors by Saeed et al. found 0.10% M.P. In present study M.P frequency 0.1% similar to recent study. While a recent study conducted at 3 blood banks of Peshawar by Ali et al. found 0.57% blood donors positive with Malaria parasite [43].

TTIs is decreasing with the passing of time but more improvements can be done by following the instruction for choosing blood donor and screening of blood and blood products more accurately. Moreover techniques like cross-match, ELISA (Enzyme linked immune sorbent essay) and PCR (polymerase chain reaction) should regulate in blood bank as soon as possible. It can minimize the TTIs to a great limit.

However to lower the TTIs, there should be a group of person who keenly check blood donor selecting process. These persons should be loyal and should keep record of all Blood banks nationally. There should be a proper and sensitive checking on blood screening process and post-transfusion infections among infected recipient.

Table 2 : HCV and HBV prevalence among young blood donor of Pakistan

Author	Area & Year of Study	Population size	HBsAg % (+ve)	Anti-HCV % (+ve)	Referece
Sultan et al.	Lahore, 2005	41498	2.22	3.68	[28]
Chaudhary et al.	Rawalpindi, 2006	1428	2.45	2.52	[33]
Aziz et al.	Skardu, 2006	850	8.40	1.10	[44]
Azam et al.	Karachi, 2007	688	4.50	4.36	[31]
Khan et al.	Quetta, 2007	1474	4.80	1.80	[39]
Nazar et al.	Karachi, 2008	11459	1.71	2.06	[30]
Manzoor et al.	Lahore, 2008	6659	1.70	7.69	[35]
Naizi et al.	Rawalpindi, 2010	160552	1.48	2.6	[38]
Waheed et al.	Islamabad, 2011	10145	3.91	8.34	[45]
Hussain et al.	Multan, 2013	48020	2.32	3.44	[37]
Saeed et al.	Lahore, 2015	18274	1.10	2.62	[14]
Arshad et al.	Karachi, 2015	16602	1.84	1.7	[34]
Zameer et al.	Lahore, 2016	10048	1.59	3.75	[36]

Table 3 :HIV, Syphilis and M.P prevalence among blood donors

Author	Year and area of Study	Population Size	HIV % (+ve)	Syphilis % (+ve)	M.P % (+ve)	Reference
Manzoor et al.	Lahore, 2009	6659	0.05	0.5		[35]
Naizi et al.	Rawalpindi, 2010	160552	0.02	0.95		[38]
Waheed et al.	Islamabad, 2011	10145	0.0	0.89	1.20	[45]
Hussain et al.	Multan, 2013	48020	0.01	0.07	0.06	[37]
Saeed et al.	Lahore, 2015	18274	0.02	1.55	0.10	[14]
Arshad et al.	Karachi, 2015	16602	0.04	2.1	0.07	[34]
Zameer et al.	Lahore, 2016	10048	0.11	2.08	0.39	[36]

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