

Transfusion Related transmission of infections among blood donors of South Punjab

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Abstract

Objective: To investigate the frequency of blood transmissible infections in the region of South Punjab.

Study design: Descriptive cross-sectional study.

Place and duration: Study was carried out from February 2019 to February 2021 over a period of 2 years at private hospital of Multan.

Materials and Methods: All voluntary and replacement donors who arrived at the hospital between the included time period were considered for the analysis. Total two blood samples were taken from each blood donor. For blood grouping and malarial parasite screening, Ethylene diamine tetra acetic acid (EDTA) sample was collected. Clotted sample was used for screening of Anti-HCV, HBsAg, HIV and syphilis and analyzed by ELISA.

Results: Our study showed cumulative frequency of 0.8 %, 0.5% and 1% for hepatitis B, syphilis and C virus respectively, and only one case of HIV and malarial parasite observed during screening for blood transfusion among blood donors.

Conclusion: Increasing transmission prevalence of hepatitis as well as syphilis in our region.

Keywords: blood transfusion, infection, HBsAG, HCV.

Introduction

Blood transfusion is an innate component of medical and surgical emergency management. It is a life-sustaining strategy, and a lot of individuals are rescued every year. However, transfusion of blood is linked with some risk factors that can result in serious problems for the patient. It may cause early or late

problems and carries the possibility of infection transmission that might be deadly rather than life saving. Although blood transfusion is fundamental component of emergency medical management which can rescue a lot of lives worldwide every year, but it has a potential risk for life.

Transfusion-transmitted infections (TTI) result from the entry of a disease causing bacteria, virus or

protozoa into a blood recipient through blood transfusion. The goal of transfusion practices is to reduce the risk of TTIs to as low as possible. A wide variety of virulent organisms, including viruses, bacteria, parasites and prions can be transmitted through blood transfusions. Majority of post transfusion diseases are caused by human immunodeficiency virus (HIV), hepatitis C virus (HCV), hepatitis B virus (HBV), Treponema pallidum and malaria parasites.

A diversified risk of TTI still persists due to inability to find suitable donors for blood donation, the window period following infections when the testing assays applied cannot detect the virus, the sensitivity of applied tests, or releasing of inappropriate donations in error (the highest proportion of errors are associated with processes of labelling, blood collection and issue of blood products).

Thus, appropriate selection of suitable donors and genuine screening tests with high specificity and sensitivity is required to reduce this risk of infection transmission through blood. Providing an adequate and safe supply of blood is one of the most integral part of any blood transfusion organization. Transfusion safety cannot be guaranteed by only doing donor's clinical screening. There can be failure to reveal facts, such as infections unknown by the donor or chronic asymptomatic disease. For this reason, standard serological screening with laboratory tests of high sensitivity and specificity is indispensable to minimize the risk of transmitting infections.

Materials and Methods

Setting: Hospital-based blood bank.

Duration: Data from the study was collected from February 2019 to February 2021 over a period of 2 years at private hospital of Multan.

Type of Study: This is a descriptive cross-sectional study based on data collected from voluntary and replacement donations in the hospital.

Sampling Method: All voluntary and replacement donors who arrived at the hospital between the included time period were considered for the analysis. Serology for hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) was performed. Malaria was screened by immunochromatographic antigen-detection tests. Syphilis was screened using an electrochemiluminescence immunoassay to detect treponema pallidum (TP) antibodies.

Results

This descriptive cross sectional study was carried out at Blood Bank and Transfusion center of private sector City hospital Multan, during the period from February 2019 to February 2021, after fulfilling approval criteria of institutional ethical review committee. A total of 7858 donors of blood fulfilling the inclusion criteria were accepted for this study. Among all 34 were females and rest were males. Total two blood samples were taken from each blood donor. For blood grouping and malarial parasite screening, Ethylene diamine tetra acetic acid (EDTA) sample was collected. Clotted sample was used for screening of Anti-HCV, HBsAg, HIV and syphilis and analyzed by ELISA.

Table 1: Blood group * blood group Rh factor Cross tabulation

	% with in blood group Rh factor		
	blood group Rh factor		Total
	negative	positive	
O	53.8%	44.1%	44.9%
A	15.6%	17.7%	17.6%
B	26.8%	34.9%	34.2%
AB	3.9%	3.2%	3.3%
Total	100.0%	100.0%	100.0%

Table 2: Frequency of different transmissible infections

	Frequency Positive cases	Perc ent	Frequency Negative cases	Perce nt
Hepatitis B	63	0.8	7795	99.2
Hepatitis C	77	1.0	7781	99.0
HIV	1	0.0	7857	100.0
Syphilis	38	0.5	7820	99.5
Malarial parasite	1	0.0	7857	100.0
Total number of cases				7858

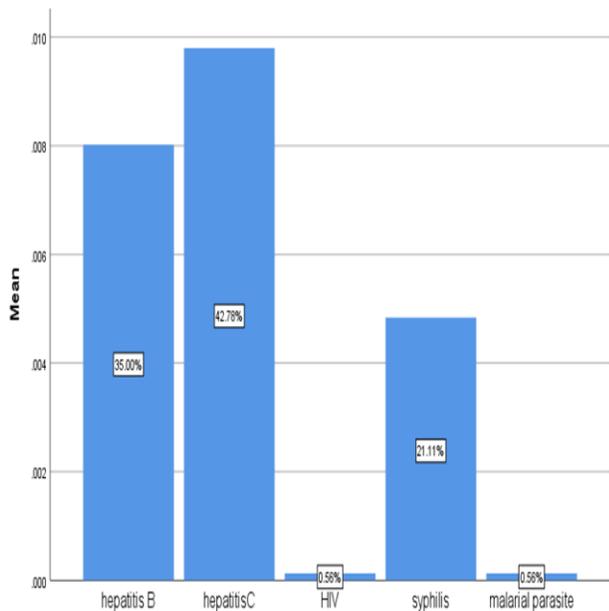


Figure 1: Bar Chart representing hepatitis B, C, HIV, syphilis, malaria among total infected donors

Table 3: Cross tabulation: frequency of infections among blood groups

	Blood groups				Total
	O	A	B	AB	
Positive cases					
Hepatitis B	32	9	18	4	63
Hepatitis C	38	17	20	22	77
HIV	0	0	1	0	1
Syphilis	13	11	14	0	38
Malarial Parasite	1	0	0	0	1
Total positive cases=	180				

Discussion

Secure blood transfusion facilities are one of the fundamentals of a successful system of healthcare. However, inappropriately taking blood for transfusion purposes is a risk of transfusion transmitted Infections and can be hazardous to life. Developing countries like Pakistan faces multiple challenges in blood bank maintenance services. The high prevalence of blood borne infections, including HCV, HIV, HBV and syphilis continue to be a disturbing aspect during past few years.⁵ Blood transfusion centers in most regions of our country lack a standard quality based serological and Nucleic acid detection tests for screening.

For any infection, window period is the duration between the exposure to infectious agent and the appearance of detectable viral markers in serum. Nucleic acid test detects viral deoxyribonucleic acid

(DNA) or ribonucleic acid (RNA) in the blood. As it is a highly sensitive technique which involves amplification of targeted parts of the viral genome. But due to deficient facilities in southern areas of Punjab, viral infections are screened by serological testing. Surprisingly, in many blood banks, low quality, rapid manual processes are being utilized for quick early screening along with mediocre laboratory methods. A study was conducted from 2019 to 2021 in the blood bank of private sector hospital in southern Punjab. The results showed serological tests showing 0.8% donors reactive for hepatitis B, 1.1% for hepatitis C and only one blood donor for human immunodeficiency virus. The frequency for syphilis and malaria was 0.5% and 0.01%, respectively. This study shows that most prevalent ABO group in the study population of southern Punjab is 'O' while 'AB' is least prevalent. Overall trend of distribution is O>B>A>AB in our study based on southern Punjab.

Trend of blood group distribution in our study is similar to previous study done in region of Faisalabad , but contrary to study done by Zafar et al, in which A blood group is more prevalent than O .

Frequency of transfusion transmissible infections in our study is 2.3% comparable to other studies conducted in other regions of country. For example, earlier studies from Karachi, Islamabad, and Faisalabad reported a seroprevalence of 3.2%, 5.8 and 6.55%, respectively , , . Another study conducted in Children Hospital and Institute of Child Health in Lahore, Pakistan from 2015 to 2016 demonstrated a much higher rate of frequency of TTIs in donors (7.94%) than our study (2.3%) .

Prevalence of anti-HCV in current study is 1.0% comparable with previous study in Islamabad which reported a prevalence of 1.03%⁹. Higher prevalence is noted in other studies 3% and 2.46% , . The disparity among the prevalence at different hospitals may be secondary to differences in quality control practices and might be secondary to the fact that the private sector hospital caters to a good socioeconomic group which may be related to the low burden of HCV in the current study.

The overall prevalence of hepatitis B in our study was 0.8%, comparable with some local studies which displayed 0.9, and 1.10% and 1.29% , , . There is possibility of decreasing trend of HBV due to the availability and increased awareness of vaccinations against HBsAg. Our reported prevalence were on the lower side when compared with studies from Sudan (11.7%) and Tanzania (8.8%) and slightly higher from Iran (0.13%) Brazil (1.63%) and Bangladesh (1.4%) .

The overall prevalence of HIV in the present study was very low, as we found only one case positive for HIV through serology. Like our study two studies even reported a zero prevalence for HIV in blood donors¹⁵. It is also comparable with previous local studies which have reported a low prevalence of 0.04, 0.02, 0.07^{10,16}. Similarly, studies from Egypt (0.00%), Iran (0.002%) and Bangladesh (0.03%)²² reported very low prevalence. While Ethiopia (2.6%), Cameroon (4.44%) and South Africa (1.13%) showed higher prevalence as compared to our results.

The positivity of syphilis in our study was 0.5%. A national survey recently conducted by the national blood transfusion program, however, reported a low prevalence rate of 0.72%. However, the finding was comparatively lower compared with other local studies which reported a rising prevalence trend for syphilis 1.115, 2.110 and 1.55%¹⁶. Studies from several African countries have observed a high prevalence, for instance, Nigeria, (3.1%), and Angola (20.0%) while data from developed countries indicate a low prevalence comparatively, Iran (0%), United States of America (0.16%), and Italy (0.031%).

The malaria positivity in the present study was 0.0%. Earlier studies from Pakistan have reported a results of 0.115 0.07%¹⁰ from Karachi while a high prevalence (0.89%) was witnessed from Faisalabad¹¹. The current lower prevalence finding validates the presumption that malaria poses less risk to blood safety in the Multan region by virtue of decreased frequency due to hot less humid climate.

The disparity in the prevalence of transfusion transmitted infections across different hospitals reflect lack of harmonious safe transfusion practices. Another factor contributing factor is differences in socioeconomic groups, with private sectors catering to a good income group. This makes population-based studies an important requirement to identify different factors affecting transfusion transmitted infections. Identification and analysis of contributing factors will lead to control of these diseases in the general population. Other interventions should be done simultaneously to decrease frequencies of infections including educating healthcare and public force regarding transmission of blood infections. There is need to put stress on importance of strict donor deferral criteria, and conducting audits to note the frequencies and trend of these infectious agents after application of such interventions.

Conclusion

In our study most of infected cases have O blood group. Total donors of AB blood group are low this is due to low percentage of this blood group, naturally. Hepatitis transmission is greater as compared to HIV.

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