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Seroprevalence of Hepatitis B, Hepatitis C and Human Immunodeficiency Virus among volunteer blood donors in district Kech, Baluchistan: a cross-sectional study

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Abstract

Objective: The study aims to determine the seroprevalence percentage of Hepatitis B (HBV), Hepatitis C (HCV) and Human Immunodeficiency Virus (HIV) in volunteer donors of blood in district Kech.

Methods: The study was cross-sectional, conducted among volunteer blood donors presenting in donation camps in district Kech from May 2023 to September 2023, Kech thalassemia center screened for Hepatitis B, C and HIV using Rapid kit testing. A non-probability consecutive sampling technique was adopted. Data were analyzed using SPSS-26.

Results: The average age of study participants was 26.88±8.24 years. Out of 512 donors, 511 (99.8%) were male and 259 (50.6%) were married. 112 (21.9%) donors were not formally educated 294 (57.4%) participants donated blood in the last year and 8 (1.6%) have received blood transfusion in the past. Among donors 6 (1.2%) screened positive for HBV, 2 (0.4%) screened positive for HCV and 2(0.4%) screened positive for HIV.

Conclusion: Blood Donors can be the source of transfusion-transmitted infections. Precautionary measures should be taken to minimize the spread of transfusion-transmitted infections.

Keywords: Prevalence, HBV, HCV HIV, Blood donors.

Introduction

Blood is donated by voluntary donors of blood who come to blood centers and those who participate in camps conducted outside the blood centers. The most important treatment option for life-threatening conditions is blood transfusion.[1] It is also used for anemia and thalassemia major patients who rely on routine blood transfusions due to poor health conditions.[2] In Pakistan, approximately 1.5 million

transfusions are done yearly and around 3.5 million donations of blood are collected annually.[3] Blood donors worldwide collect over and beyond 112.5 million units of blood annually and 18 million or more units of blood are not screened for different infections that are transmitted by blood.[4]

Unsafe blood transfusion can be fatal due to transmission of blood-borne pathogens known as transfusion-transmissible infections (TTIs).[5] Various infections like HBV, HCV, and HIV which are the most frequent, can be spread via blood.[6] HIV and HBV are transmitted through standard modes, including blood-borne and vertical routes.2 HBV and HCV are transmitted through various routes such as blood, sexual contact, and abrasions with contaminated sharp objects and from mother to child through vertical route.[7-8]

Hepatitis B and C are the two main causes of chronic liver disease, including chronic hepatitis, cirrhosis, and hepatocellular carcinoma (HCC).[9] HIV can affect immunity by decreasing the number of CD4 T Cells.[10] So it is important to decrease and prevent the TTIs in those patients who are at risk of infectious disease by multiple transfusion.[11]

In Pakistan, 150000 HBV and 250000 HCV are reported annually and globally HBV infects almost 350 million populations, HCV infects 200 million populations and HIV infects 38 million populations.[6-12] About 6.90% is suffering from HCV infection in Baluchistan.[8] Inadequately screened blood can be risk of transmitting blood-borne infections to the blood receivers.[12] The World Health Organization (WHO) argued screening donated blood for major TTIs to assure quality and safety.[5]

Due to lack of awareness and poor screening facilities, occurrence of TTIs is still a problem in our country. The occurrence of Hep B and C virus in Pakistan is the highest.[9] Due to the increased prevalence of TTIs and decreased awareness about screening in Pakistan, our current study is focused on finding the prevalence of hepatitis B, C and HIV among donors of blood. It also sought to raise awareness of these issues among the people of district Kech so that they could take precautions to lessen their risk of infections in the future.

Methodology

At donation camps, a cross-sectional study was conducted throughout district Kech, Balochistan from May 2023 to September 2023. The apparently healthy volunteer donors of blood were screened for HBV, HCV and HIV using rapid kit tests. The sample size was calculated to be 384 using OpenEpi with a 95% confidence level. The written consent was taken from all participants. Blood donors younger than 18 years, donors with anemia and malaria were excluded. The demographic profile details such as age, gender, marital status, level of education and history of previous donations, transfusion and deferral were taken from donor records using a structured questionnaire. Ethical approval was obtained from the ethical committee of MMC Turbat under ref.no MMC/ERC/2023/MAY/5. Blood was drawn from donors and rapid kit test was based on an immunochromatographic technique for detection of antibodies specific for HBV, HCV and HIV. The Data was entered on SPSS-26 for statistical analysis using simple descriptions such as frequencies and percentages.

Results

512 donors were contacted for blood donation and screened for TTIs. Out of 512 participants one was excluded. The mean age of donors was 26.88±8.24 years. Among study participants (99.8%) were male, (50.6%) donors were married, (21.9%) donors were not formally educated. The monthly income of participants along with demographical details of donors is mentioned in. (Table 1)

(57.4%) participants have donated blood in the last year and only (1.6%) participants have received blood transfusion in the past.

Out of 512 donors, 6 (1.2%) were seropositive for HBV, 2 (0.4%) were positive for HCV and 2 (0.4%) tested positive for HIV. (Table-2)

Parameter		Frequency	Percentage
Gender	Male	511	99.8
	Female	1	0.2
Marital status	Single	253	49.4
	Married	259	50.6
Education Level	No formal Education	112	21.9
	Primary Education	73	14.3
	Secondary Education	117	22.9
	HSSC	105	20.5
	BS/BA	69	13.5
	MS/MA	33	6.4
	PhD	3	0.6
Monthly Income	10,000-20,000	114	22.3
	20,000-30,000	88	17.2
	30,000-40,000	57	11.1
	40,000-50,000	31	6.1
	50,000-60,000	18	3.5
	>60,000	49	9.6
	not mentioned	155	30.2
	Total	**512**	**100.0**

Table 1: Demographical details of study participants.

	Seropositive n (%)	Seronegative n (%)
HBV	6 (1.2%)	506(98.8%)
HCV	2(0.4%)	510(99.6%)
HIV	2(0.4%)	510(99.6%)

Table 2: Seroprevalence of HBV, HCV, and HIV.

HBV: Hepatitis B virus; HCV: Hepatitis C virus; HIV: Human Immunodeficiency virus

Discussion

Seroprevalence rates of the hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) in donors of blood revealed a significant public health challenge, requiring the urgent necessity for the implementation of public health interventions that specifically address these concerns. Studies have persistently revealed that the leading pathogens associated with transfusion-transmitted infections (TTIs) in Pakistan are notably the hepatitis C virus (HCV), the hepatitis B virus (HBV), and the human immunodeficiency virus (HIV), as reported by previous study.[13-14] It is noteworthy to mention that HCV has emerged as the most widely spread TTI in blood donors in Pakistan with documented rates oscillating between 1.5% to 3.82%, depending upon the parameters and methodologies applied in different studies.[13-15] The problem of HBV poses a public health danger with prevalence statistics between 1.08% to 1.7% among the donor community, which further emphasize the critical nature of these circumstances.[13-14] Understanding the demographic and genetic characteristics of donor populations, such as those documented in the Baloch ethnicity of Mekran Division, is essential for interpreting these prevalence patterns and developing targeted screening strategies.[15] While HIV is reported to be less prevalent in comparison to HCV and HBV, nevertheless it remains a crucial TTI with certain regions documenting seroprevalence rate of 0.15%, therefore highlighting the need for continued surveillance and intervention strategies to combat this virus.[13]

The majority of blood donations are derived from the alternate donors, who frequently do not undergo the rigorous screening processes consequently exacerbating the risk of transmission of TTIs.[13-14] Moreover, it has been observed that numerous blood transfusions centers are lacking in comprehensive and systemic screening protocols, resulting in elevated risk of transmitting TTIs.[16] The absence of centralized system for blood collection, coupled with inadequacy of sufficient screening assays, significantly contributes to the heightened risk of TTIs, thus demanding immediate actions[13,17].

Despite the troubling prevalence of TTIs in Pakistan, it is important to acknowledge that efforts to tackle these pressing challenges are underway. Strategic initiatives promoting refined screening methods and bolstering public health infrastructure are deemed essential component in the fight against TTIs in volunteer blood donation practices. It is vital to acknowledge that the effectiveness of government initiatives demands cooperation acres diverse areas to achieve real success and lasting impact.[13, 17]

The rate of seroconversion linked to TTI like HBV, HCV, and HIV show significant differences among groups considered high risks, especially individuals who undergo multiple blood transfusions. Recent studies have unveiled that individual with conditions like hemophilia, thalassemia are particularly at vulnerable to contracting TTIs.[18] A study has reported incredible 54.5% of hemophilia patients showed positive results for anti-HCV antibodies and 9.09% tested positive for HbsAg, with none showing signs and sero-indication of HIV.[18] In contrast among thalassemia patients the prevalence rate of HBV, HCV were both reported at 5%, further highlighting the ongoing risk of TTIs within these groups.[18]

A review reported the seroprevalnce figures among blood donors from India, HBV at 0.53%, HCV at 0.098%, and HIV at 0.08%.[19] another study conducted from 2004 to 2018 has shown ongoing threat of infections linked HBV, HCV, and HIV registering rates of 0.57%, 0.80%, and 0.035% donations respectively, with observable reduction in the incidence of these infections identified over the years.[20]

To combat these challenges associated with transfusion transferred HBV, HCV, and HIV a multi-factorial approach is needed. The strategies emphasize the enhancement of screening protocols, employment of advanced testing technologies, and establishment of rigorous donor selection processes to ensure the overall safety. The application of individual donor nucleic acid testing (id-NAT) has shown significant promise in improving the detection capabilities of viral infections by identifying pathogens during the critical window period, where traditional serological test may fails.[21-22] empirical studies have demonstrated that NAT can successfully identify the infections typically overlooked by serological test.[21] Implementation of combined immunoassays (IAs) enhances the sensitivity for identifying the early

infections due to the ability to detect antibodies as well as antigens simultaneously.[23] Furthermore adopting a sequential IAs approach is beneficial as it can improve the overall accuracy of screening by confirming the reactive results through implementing additional testing protocols.[23]

Careful selection of donors based on epidemiological data can minimize the occurrence of TTIs in donor population.[24] Continuous education and awareness about TTIs among healthcare providers and donors are crucial for improving blood safety.[24] These infections pose significant health risk, particularly in a country with a high prevalence of viral hepatitis and a healthcare system that faces challenges in ensuring safe blood transfusions. The prevalence of these infections in donors of blood highlights the ongoing threat they pose to public health. The risk factors associated with their transmission include inadequate screening processes, reliance on replacement donors and insufficient public health infrastructure. While these measures significantly enhance blood safety, challenges continue to exist, specifically in resource limited settings, where approaches to advance testing technologies may be confined. Balancing cost and safety is essential for optimizing transfusion practices globally.

Conclusion

Transfusion-Transmissible Disease infections were present among blood donors at District Kech Balochistan. Effective healthcare strategies should be implemented to minimize the spread of transfusion transmitted infections. More planning and methods are needed to increase screening in the population of district Kech, Baluchistan.

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Authors Contribution:

Syed Bilal Shah: Study design, data collection, analysis and interpretation; writing of results, discussion, and conclusion; final revision and review of manuscript; agree to be held accountable for all aspects of study.
Muhammad Wajid: Study design, data collection, and interpretation; writing of abstract, methodology, and results; final review of the manuscript; agree to be held accountable for all aspects of study.
Safiullah: Study design, data collection, and analysis; writing of Introduction, and methodology; final review of the manuscript; agree to be held accountable for all aspects of study.
Mina: Study design, data collection, and analysis; writing of Introduction; final review of the manuscript; agree to be held accountable for all aspects of study.
Attaullah: Study design; writing and revision of manuscript; final critical review and approval of the manuscript; agree to be held accountable for all aspects of study.
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