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Prevalence of HBV, HCV, HIV and syphilis in blood donor at Mardan Medical complex, Khyber Pakhtunkhwa, Pakistan

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Abstract

The current study was valued to find the incidence of Hepatitis B, Hepatitis C, VDRL (venereal Disease Research Laboratory) and HIV in the healthy blood donors of Mardan and its neighboring districts of KPK in the period from December 2017 to 2018. A total of 4552 blood donor's samples were screened through ELISA kit (ARCHITECT i1000SR automated immunoassay analyzer chemiluminescent microparticle immunoassay). In total 4552 blood donor's HIV, occurrence was 0.04%, (2/4552), HBV occurrence was a little higher than 1.31%, (60/4552), VDRL occurrence was recorded in the range of 0.63%, (29/4552), while HCV was limited to the value of 1.2%, (54/4552). The current study also exposed the spreading design of HIV, HBV, HCV and VDRL in the blood groups of responsive samples. Blood group O+ was holding the peak incidence value i.e. HCV 29.62% (16/54), HBV 33.33% (20/60), HIV 50% (1/2), VDRL 34.48% (10/29). Shadowed by A+ 16.66 (9/54), HBV 20% (12/60), HIV 0% (0/2), VDRL 20.68% (6/29). And B+ was holding values in HCV 11.11% (6/54), HBV 15% (9/54), HIV was not noted in this regard, while VDRL is 30.76% (8/29). These statistics outcomes recommend uncertain degree of occurrence, still a much wide seroprevalence analysis of the over-all population are required to find the correct occurrence.

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Introduction

Medical treatment objectives are to support health and salvaging lives. Yet medical treatment methods may sometimes be directly or indirectly detrimental for patients and may even leads to death (ÖNER *et al.,* 2011). One out of two individuals in the creation needs blood transfusion at minimum once or more. The clinical conditions where blood transfusion is compulsory are surgical and traumatic origins such as thalassemia, severe anemia, leukemia, hemophilia and pregnancy snags. These two are the most communal causes in emerging countries (*Liumbruno et al.,* 2011). According to the Global Database on Blood safety report by World Health Organization (WHO) for the duration of 2000-2001 quantified that 500,000 women died thru pregnancy or within the duration of 12 months after delivery. So, these roots increase the necessity for blood transfusion due to traumatic reasons (ÖNER *et al.,* 2011).

Blood donation is a pivotal procedure which saves thousands and millions of lives, but contaminated and unsafe transfusion methods also infer its effects on millions of people and cause transfusion-transmissible infection (TTIs) (*ÖNER et al.,* 2011). Every year 1.5 million people become infected by blood transfusion. As blood, can play a pivotal role in medication and health care, it is also responsible for the blowout of numerous infections (*Sultan et al.,* 2007). An insecure blood transfusion is very expensive from economic and human perspective. The infected blood brings its future in the form of long-term sickness and mortality, delayed viremia and some hidden states of diseases, and far-echoing consequences, for the recipients as well as for their families and societies (*Tessema et al.,* 2010). Viruses, bacteria, fungi and so many parasites can be transmitted via blood or by its products. Hepatitis A, B, C, D, E and G are that type of viruses which cause liver infection by attacking liver and hepatitis infection is the main cause of mortality and morbidity (Siddiqui *et al.,* 2012).

As it is well known that the transfusion of blood is a lifesaving involment but however it may be possible that this transfusion results in the transmission of life threatening diseases like hepatitis B and C, HIV, syphilis, malaria etc by carrying these infection (Sawke *et al.,* 2010*;* Okoroiwu *et al.,* 2018*).*

In 2015 World Health Organization gives a report that the prevalence of Hepatitis B Virus (HBV) infection was 3.5% in 257000000 persons. Ratio of prevalence is higher in Africa about 6.1% and in West pacific about 6.2%. On the other hand, America had 0.7%, South East Asian region had 2.0%, East Mediterranean region had 3.3% and European region had 1.6% (Lange *et al.*, 2017). While in a survey of about 128 countries including China, Indonesia, India, Philippines and Nigeria the prevalence of HBV is 4.9% having more than 57% of all positive cases of HBs Ag *(Razavi-Shearer et al.,* 2018). In 2015 survey of WHO it is reported that 71000000 people have HCV infection which is 1% of the total world population. In the case of HCV, the highest prevalence is found in Eastern Mediterian region 2.3% and European region of 1.5%. While in Western Pacific region, African region, South East Asia region and American region have 0.7, 1.0, 0.5, 0.7% respectively (Lange *et al.*, 2017). WHO guesses that around 2 billion people are diseased by HBV in the globe and around 350 million are long-lasting HBV transporters. Four million severe clinical cases are seen in each four year and 25% of these can serve as carrier for the infection WHO guesses that 3% of the globe population holds HCV infection. Around 4 million carriers are present in Europe (*ÖNER et al.,* 2011). Sexual intercourse and organ transplantation can transmit HIV and syphilis horizontally and mother can transmit it to its offspring vertically (*Sallam et al.,* 2003). In emerging countries syphilis is much more common and can reach 25% in blood donors. Syphilis can defuse from diseased one to a healthy one through infested blood products like blood transfusion or the use of disease-ridden needles (*Shamsul et al.,* 2000). World widely about 36700000 people were infected with HIV at the end of 2016. Approximately about 0.8% of the adult population aged 15 to 45 years is infected with HIV, though ratio of infection is different in different countries and regions. The most harshly affected region of the world is Sub Saharan Africa where

about 1 in every 25 adults (4.2%) is infected with HIV which is two-third of the entire infected people world widely (*WHO report* 2015). In 2010 34 million people were infected with HIV/AIDS, while 30 million have already died with AIDS and its related diseases. 2.7 million people were newly infected in 2010 with the results that 1.8 million men, women and children died of AIDS-related diseases (Patton *et al.,* 2009). A mounting problem of co-infection of hepatitis with HIV in individuals is emerging. Those who get diseased with HIV through needle contact may be due to drug use, 40% or more may also have HCV. HIV, Hepatitis C, Hepatitis B and syphilis can be defused through blood transfusion and may result in problems. Donor must be screened properly, for the prevention of any threat to the patient. The danger of passing these diseases can be restricted by proper and accurate screening of the donor (*Ayele et al.,* 2002) In 2014, a report of Global Aids Response Progress Reports (GARPR) showed that in adults about 25.1 cases per 100,000 are infected by syphilis disease (*WHO report* 2013). 5.6 million people have Syphilis disease per year *(Okoroiwu et al.,* 2018). Syphilis, a sexually conveyed disease instigated by *Treponema pallidum*. Persons who are not treated for this infection can not only have an ulcer but also can present other symptoms like chancre, mucocutaneous lesions, skin rash, and lymphadenopathy, together with this also cranial nerve dysfunction, auditory or ophthalmic abnormalities, and cardiac or gummatous lesions (Allen *et al.,* 2013).

The aim of this study was to kept an eye on the spreading over rate of Hepatitis B&C HIV and VDRL in the mentioned areas of KPK, Mardan and its surrounding areas. Previously such combined study was not done on these particular diseases and also the study was done in Peshawar but not much study was done in the surrounding areas of Khyber Pakhtunkhwa. Another factor was all the results came with the blood donor and by chance through test pre-transfusion of blood the results were positive for the particular diseases. Hepatitis B & C are very deadly diseases spreading very fastly in developing and underdeveloped countries especially in Asia.

To investigate the occurrence of these diseases and to inform the common people who are un-aware of the signs and symptoms and to start treatment on time to overcome these deadly diseases.

Materials and methods

Study area

The current case study was done on an area of Khyber Pakhtunkhwa (KPK) named Mardan medical complex Mardan during demonstrational and observational study carried out from December 2017 to April 2018, (duration of 5 months).

Sample and data collection

To notice the occurrence of VDRL, HIV, HCV and HBV in the blood samples of the blood donors in the Pathology lab of Mardan Medical complex, Mardan KPK Pakistan. blood samples were examined and screened via Chemiluminescent Microparticle Immunoassay (CMIA). (ARCHITECT i1000SR automated immunoassay analyzer). Information concerning health, age and gender of BDs were logged on regular basis.

Data analysis

All the tables were generated using MS word 2016. The data recorded and put in tabular form.

Results and discussion

The infection of HBV and HCV is one of the chief challenges countenance everywhere in the world. Most of the developed countries have efficiently controlled this difficulty by focusing on vaccination and controlling the risk factors for spread in people. However, many developing countries, including Pakistan are still incapable to effectively control this infectious disease. In our study, among the blood groups, the O positive showed higher rate 34.03% (1526) of prevalence followed by A positive 25.22% (1151), B positive 23.57% (1076), and AB^{+} 9.40% (431) individually. A negative blood group ratio was a bit low and was perceived to be in the range of 2.95% (141), followed by B negative in the ratio of 2.70% (126), and AB negative ratio was 1.50%, whereas O negative was the least of them all showing its ratio in the range of 0.60% (30).

On the basis of current observation, the difference of prevalence in the blood groups in the human residents might be due to environmental and genetical factors.

Table 1. Type of blood group among blood group donors.

S.No	Blood Group	Prevalence	Percent %	Lawful percent	Collective percent
1	O^+	1526	34.0354	34.0354	34.0354
2	A^+	1151	25.2259	25.2259	59.2613
3	B^+	1076	23.5784	23.5784	82.8397
4	AB^+	431	9.4087	9.4087	92.2484
5	A^-	141	2.9504	2.9504	95.1988
6	B^-	126	2.7084	2.7084	97.9072
7	AB^-	71	1.5004	1.5004	99.407
8	O^-	30	0.6004	0.6004	100
Total	8	4552	100	100	

In the entire tested 4552 blood donors 1.31% (60), were branded HBV positive and while there was no such case which was recommended for additional analysis (Table 2). Pakistan is prevalent to HBV (*Ali et al.,* 2009), some other revisions have been recognized from Pakistan which shows wide-ranging occurrence of HBV in BDs, form diverse areas (Ahmed *et al.,* 2000; Mehr *et al.,* 2013*;* Abbas *et al.,* 2000; Tarantola & Mann, 1996; Sheikh *et al.,* 2004*).* The HBV occurrence in across Pakistan has been testified to be 3%, 3.2% and 4% in several populations (Shah *et al.,* 2015*;* Matee *et al.,* 2006).

Table 2. Occurrence of HBV in blood donors.

HBV	Rate	Percent	Lawful percent	Collective percent
Undetermined	0	0	0	0
Positive	60	1.31	1.31	1.31
Negative	4492	98.69	98.69	100
Total	4552	100	100	

In 4552 blood donors, the occurrence of HCV was found 1.2%, 54 blood samples were positive and no such sample was mentioned which was recommended for further analysis (Table 3). HCV is an apprehension for both developed and undeveloped countries. The Previous studies documentation shows high occurrence of Anti-HCV and reactive HCV infection from different part of the Pakistan which diverges from this study.

The likely decrease in our study could be due to augmented awareness, safety measures and education about the blood born infection in BDs.

Table 3. Occurrence of HCV in blood donors.

HCV	Rate	Percent	Lawful percent	Collective percent
Undetermined	0	0	0	0
Positive	54	1.2	1.2	1.2
Negative	4498	98.8	98.8	100
Total	4552	100	100	

The occurrence of HIV in entire 4552 blood donors was 0.04% and nobody was accredited for additional studies as depicted in table 4. The occurrence of HIV in some countries around the world is higher (Sheikh *et al.,* 2004), while in Pakistan its occurrence is less 1%, (Shah *et al.,* 2015), the reduced occurrence can be due to minimal acquaintance of the factors allied with HIV transmission (Matee *et al.,* 2006).

Table 4. Occurrence of HIV in blood donor.

HIV	Rate	Percent	Lawful percent	Collective percent
Undetermined	0	0	0	0
Positive	2	0.04	0.4	0.4
Negative	4550	99.96	99.96	100
Total	4552	100	100	

On the other hand, the standard nontreponemal tests for syphilis include the Venereal Disease Research Laboratories (VDRL) slide test and the rapid plasma reagin (RPR). These tests measure antibody directed against lipoidal antigen that result from interaction of host tissue with *T. pallidum*. These tests are inexpensive, rapidly performed, and provide quantitative results, which are helpful indicators of disease activity and useful to monitor the response to treatment. Nontreponemal test results may be falsely negative in nonreactive, in early primary syphilis, latent acquired syphilis of long duration or late congenital syphilis. The occurrence of VDRL in all 4552 blood donors was 0.63%, and again no recommendation for further analysis as depicted in table 5. In more developed and financially prudence countries, syphilis seropositivity is shown lower and is being fewer than the value of 1.0% as evidenced in numerous information. Seroprevalence of syphilis in blood donors were described in complex outcomes

from different countries like Tanzania 12.7% (*Bloch et al, 2012*), Ethopia 12.8% (*Adjei et al.,* 2003), Ghana 7.5% (Butsashvili *et al.,* 2001), Georgia 2.4% (Chikwem *et al.,* 1997), and in Nigeria 3.6% (Jeremiah *et al.,* 2008) which can be described by the advanced seroprevalence of syphilis in the mentioned countries. As compared to the study conducted recently males are more pretentious of syphilis as compared to females.

Table 5. Occurrence of VDRL in blood donors.

VDRL	Rate	Percent	Lawful percent	Collective percent
Undetermined	0	0	0	0
Positive	29	0.63	0.63	0.63
Negative	4523	99.36	99.36	100
Total	4552	100	100	

Occurrence design of HCV, HIV, VDRL and HBV marker between the diverse blood group is shown in the table 6. The uppermost occurrence for HCV in the blood donors was noted in the blood group O^+ 29.62% (16/54), and the lower most was noted in B^- 5.5% (3/54). While HIV was not that much prevailed and its 2 cases were present in O^+ and B^- blood group 1 each. The maximum seropositivity of HBV was noted in blood O^+ with the ratio of 33.3% (20/60), while the minimum ratio in all the blood donors was noted in blood group O^- with 5% (3/60).

Likewise, VDRL maximum occurrence was noted in blood group O^+ with ratio of 34.48% (10/29), while the minimum value noted in the A^- blood group whose ratio was 3.44% (1/29).

The current study outcomes of HCV occurrence in total blood donors is higher in blood group O^+, our outcomes agree to (Sayal *et al.,* 1996), who has found higher occurrence of HCV in group O^+ as well. Same outcomes to our study is stated by Sayal, he detected that blood group O^+ have greater value of occurrence of infection and blood O^- has lesser (Sayal *et al.,* 1996). Similarly, a study shows the 0.95% occurrence of VDRL which is greater than our finding HIV cases were not detected like all other areas in Pakistan (Siddiqui *et al.,* 2012).

Hepatitis occurrence in Pakistan is maximum due to absence of preventive measures and treatment facilities (Mehr *et al.,* 2013) Same is the case with our studies HBV occurrence is playing it role in every type of blood group.

Table 6. Distribution pattern of HCV, HIV, HBV and VDRL in relation to blood groups.

S No	Blood group	HCV responsive	HIV responsive	HBV responsive	VDRL responsive
1.	O^+	16	1	20	10
2.	A^+	9	0	12	6
3.	B^+	7	0	9	8
4.	AB^+	6	0	4	2
5.	A^-	4	0	3	1
6.	B^-	3	1	4	2
7.	AB^-	5	0	5	0
8.	O^-	4	0	3	0
Total	8	54	2	60	29

As our findings, have shown less occurrence of HBV, HCV, HIV and VDRL but still additional widespread seroprevalence and incidence studies of the general population are still required to fix the true occurrence of these diseased markers. The probable way to limit these infections in healthy population is to track the basic biosafety guidelines and upsurge awareness among the public. Along with this basic health care centers should be established by government with all facilities, quality tools and trained staff in all inaccessible areas.

Conclusion

Though our results have shown less prevalence of HBV, HCV and HIV, but additional widespread seroprevalence and incidence studies of the general population are required to fix the true prevalence of these diseased markers. The probable way to stop such infections in healthy population is to track the basic biosafety guidelines and upsurge awareness among the public. Moreover, basic health care centers should be established by government with all facilities, quality tools and trained staff in all inaccessible areas.

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