

# Seroprevalence of Hepatitis B Virus, Hepatitis C Virus and Human Immunodeficiency Virus Infection in Tajikistan

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## Keywords

Hepatitis B, Hepatitis C, Virus, Infection,

## Introduction

Hepatitis virus infection is a serious problem worldwide. Hepatitis B virus (HBV) and hepatitis C virus (HCV) are major causes of acute and chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma [1,2]. In many development countries, most people become infected with HBV during childhood and 8- 10% of the general population becomes chronically infected [3]. The viral hepatitis has been officially recognized by WHO as global public health problem. An estimated annual cost of only HCV associated chronic hepatitis with attendant morbidity and mortality was \$5,46 billion in USA alone [3]. However, the greater part of the carriers is concentrated in the developing countries, and economic impact in the global scale is going to be much higher than present estimates. The epidemiology of HBV and HCV infection varies among region. The prevalence of HBV infection is higher in most of Asia, and the Pacific [4-6], alternatively, than of HCV infection is higher in some countries in Africa, South-East Asia, and the Western Pacific [6-9]. Although the epidemiology of HBV and HCV seems well established now, the seroprevalence of those viruses in Tajikistan is still unknown.

The Republic of Tajikistan is located in the Central of Asia. Formerly, a large of part of Tajikistan is located near to Afganistan which is known as biggest producer and exporter of the narcotic drug for European countries and the most inaccessible region for the scientific researches. The seroprevalence of HBV, HCV, and human immunodeficiency virus (HIV) infection allows tracing the narcotic drug routes that remind the modern version of the ancient Silk Road. The aim of this study was to directly evaluate

the seroprevalence of HBV, HCV, and HIV infection in Tajikistan, and to explore potential correlation between those viruses and socioeconomic risk factors.

## Materials and Methods

### Serum Samples

After informed consent, serum samples were obtained from 936 individuals in Tajikistan including Dushanbe (South), Horog (South-East) from 2005 to 2006. Risk factors of HCV infection and other demographic information were investigated using questionnaire and interview. The subjects were classified into three categories: low risk, high risk, and patients. The low-risk group was subdivided into two groups: general population and blood donors. The high-risk group included intravenous drug users (IVDU), prostitutes, medical employees (ME). The patient group included patients with HIV infection, chronic hepatitis and liver cirrhosis. Overall, the study included 600 men and 336 women. The mean age of subjects (+SD) was 31.2+3.1 years.

### Serological methods

HBsAg (Serodia: Fujirebo, Tokio, Japan), anti-HCV (Ortho HCV Ab PA Test: Ortho Diagnostic systems, Calif. USA) and anti HIV (Best Vector, Novosibirsk, Russia) were detected by particle agglutination and immunoassay tests.

### Statistical Analyses

Statistical difference were evaluated by Fisher exact probably test. Differences were considered significant for P values less than 0.05.

## Results

### Seroprevalence of HbsAG, anti-HCV and anti-HIV

One hundred seventy eight of 936 subjects (12.1%) in the low risk

group were positive for HbsAg. Furthermore, the positivity for HBsAg in the general population (14.3%) was significantly higher than that blood donors (7.3%,  $p<0.005$ ). Furthermore, the positivity for HbsAg in the general population (12.1%) was significantly higher than that in blood donors (6.4%),  $p<0.05$ ). There was not difference in positivity for HbsAg between Dushanbe (13.8 %) and Horog (11.8 %).

Three hundred forty three of 1203 subjects (28%) were positive for HbsAg in the high risk group. The positivity for HbsAg in the high risk group (28%) was significantly higher than in the low risk group ( $p<0.01$ ). In the high risk group, the positivity for HBsAg in IDU (25.7%) was significantly higher than that in prostitutes (19.3%,  $p<0.01$ ), and prisoner (16.2%,  $p<0.05$ ). The prevalence of HBV infection did not significantly differ between the IDUs and the non-IDUs. Among the IDUs, the prevalence of HBV infections was associated with sharing of needles and longer duration of injectable drugs used. The seroprevalence of HBV infection in both IDUs and non-IDUs was significantly higher among those who had a history of extramarital and premarital sex. Ninety one of 268 subjects (33.9%) were positive for HBsAg in the patients group. The positivity for HBsAg in the patients group was significantly higher than in the low risk group ( $p<0.01$ ). The positivity for HBsAg in the patients group liver diseases (39.4 %) was significantly higher than ASC (10.5%,  $p<0.01$ ) and HIV infection (9.6 %,  $p<0.01$ ).

One hundred and seventy two of 1472 subjects (11.4 %) in the low risk group were positive for anti-HCV. The positivity for anti-HCV in the general population (13.8 %) was significantly higher than in blood donors (7.3%,  $p<0.05$ ). Furthermore, the positivity for anti-HCV in Horog (14.0 %) was significantly higher than in Dushanbe (10.6 %).

Forty hundred and seventy five of 1203 subjects (24.9 %) in the higher risk group were positive for anti-HCV. The positivity for anti-HCV in the high-risk group was significantly higher than in

the low risk group ( $p<0.001$ ). In the high risk group, the positivity for anti-HCV in IDUs (43.2%) was significantly higher than in prostitutes (8.0 %,  $p<0.01$ ) and prisoner (23.6 %,  $p<0.01$ ). Thus, the prevalence of HCV infection was significantly higher among the IDUs. Among the IDUs, the prevalence of HCV infections was associated with sharing of needles and longer duration of injectable drugs used. The prevalence of HCV infection was not associated with sexual promiscuity. There was no association between the seroprevalence of HCV infections and age.

One hundred and forty eight of 1203 subjects (12.3%) in the higher risk group were positive for anti HIV. In the high risk group, the positivity for anti-HIV in IDUs (15.7%) was significantly higher than in prostitutes (6.6%,  $p<0.01$ ) and prisoner (6.3%,  $p<0.01$ ).

One hundred and forty three of 268 subjects (53.3 %) in the patients group were positive for anti-HCV. The positivity for anti-HCV in the patient group was significantly higher than in the low risk group ( $p<0.01$ ). In the patient group, the positivity anti-HCV in chronic liver diseases (55.0%) was significantly higher than in ASC (42.1%,  $p<0.05$ ) and HIV infection (48.3 %) (Table 1).

#### Risk factors for transmission of HCV

In the low risk group, blood transfusion [odd ratio (OR) = 7.9, confidence interval (CI) = 3.8-11.3,  $p<0.01$ ], operation (OR= 2.3-41.4,  $p<0.01$ ), dental treatment (OR= 3.1, CI+1.7-2.7,  $p<0.01$ ) were considered as risk factors for the transmission of HCV. In the high-risk group, drug abuse the prevalence of HCV infection was 34.3% overall (95% CI, 35%-40%) and was 68.7% among those with a history of IDU, compared with 11% among those with no history of IDU odds ratio, 19.21; 95% CI, 11.51-25.28). Significant differences in HCV antibody positivity were found in association with age at first detention. Independent correlates of HCV infection included age, history of IDU, cumulative time of incarceration, biological sex (OR for females subjects compared with males subjects, 0.35; 95% CI, 0.13-0.96), and a history of having sex with a male IDU (OR, 3.72; 95% CI, 1.36-14.47).

Category	N	M:F	Age, Years, Range, mean+SD	HbsAg positive	Anti-HCV Positive	Anti-HIV positive
Low-risk group	1472	1085:387	16-66 41, 0+3,4	178 (12,1)	172 (11,4)	0 (0)
General population	636	430:206	16-66 46, 7+3,8	91 (14,3)	88 (13,8)	0 (0)
Blood donors	341	270:71	24-47 31, 9+2,9	22 (6,4)	25 (7,3)	0 (0)
Dushanbe	310	247:63	20-61 41, 6+3,6	43 (13,8)	33 (10,6)	0 (0)
Horog	185	138:47	23-60 43, 8+3,4	22 (11,8)	26 (14,0)	0 (0)
High-risk group	1203	1130:325	15-67 36, 2+4,1	343 (28)	475 (24,9)	148 (12,3)
Prostitute	300	0:300	15-48 28, 4+4,1	58 (19,3)	24 (8,0)	18 (6,0)
Intravenous Drug Users	603	480:123	21-65 36, 1+4,0	155 (25,7)	261 (43,2)	95 (15,7)
Prisoners	802	650:202	20-67 44, 1+4,4	130 (16,2)	190 (23,6)	35 (4,3)
Patient group	268	152:116	24-65 37, 4+3,8	91 (33,9)	143 (53,3)	34 (12,6)
HIV infection	31	21:10	14-38 26, 1+2,9	3 (9,6)	15 (48,3)	31 (100)
ASC	19	9:10	22-45 32, 4+3,1	2 (10,5)	8 (42,1)	3 (15,7)
Chronic liver disease	218	122:96	18-62 48, 1+3,7	86 (39,4)	120 (55,0)	0 (0)

**Table 1:** Seroprevalence of HbsAG, anti HCV and anti-HIV among various groups in Tajikistan. Age –Related Seroprevalence of HbsAG and Anti-HCV in the Low-and High –Risk Groups.

Age years	Low risk group			High risk group		
	n	Hbs Ag positive	anti-HCV positive	n	Hbs Ag positive	anti-HCV positive
16-20	190	29 (15,2)	8 (4,2)	64	35 (54,6) <sup>a***</sup>	24 (37,5) <sup>a***</sup>
21-30	250	32 (12,8)	51 (20,0)*	268	81 (36,3) <sup>b</sup>	168 (62,6) <sup>a****</sup>
31-40	391	48 (12,2)	73 (18,6)*	290	98 (33,2) <sup>b</sup>	120 (41,3) <sup>a*****</sup>
41-50	310	31 (10,3)	19 (6,3)	341	84 (24,6)	128 (37,5)
51-60	264	29 (11,4)	16 (6,2)	150	31 (20,6)	29 (19,3)
>60	87	9 (10,3)	5 (5,7)	90	14 (6,6)	6 (6,8)
Total	1472	178 (12,0)	172 (11,6)	1203	343 (28,5) <sup>a</sup>	475 (39,4) <sup>a</sup>

**Table 2:** Age related seroprevalence of HbsAg.

Figures in parentheses are percentages.

**a:** Statistical difference with  $p < 0,01$  between the low- and high-risk group.

**b:** Statistical difference with  $p < 0,05$  between the low –and high-risk groups.

\*: 21- to 30-year-old vs.15- to 20-year olds, 41- to 50 –year olds,51-60- year olds, and 60< year –old,  $p < 0,01$ , 41- to 50-year olds,  $p < 0,01$ .

We identified significant differences in risk factors between male and female subjects--notably, that the risk of HCV infection was significantly elevated among female non-IDUs who reported having sexual partners with a history of IDU. Among non-IDUs, correlates of HCV infection included history of receipt of blood products and cumulative years of incarceration (Table 2).

## Discussion

In this study, the seroprevalence of HBV, HCV and HIV infection in Tajikistan was investigated. The seroprevalence of HVB and HCV is well established worldwide. The countries in Africa, most of Asia and the Pacific exhibit high HBV endemicity [7-9].

In those high endemic areas, most people become infected HBV during childhood, and 8-10% of people in general population become chronically infected [3]. On other hand, some countries in Africa, the Mediterranean basin, South-East Asia, and the Western Pacific are areas of high HCV endemicity [4-9]. In those counties, HCV was transmitted by medical treatment, blood transfusion, and drug abuse. So far, the study about the seroprevalence of hepatitis viruses in central Asia countries was reported only in Uzbekistan [10]. In this study, direct analysis of the population revealed that Uzbekistan was a country of high HBV and HCV endemicity. The epidemiology of HBV and HCV in Tajikistan is still unknown.

The positivity for HBsAg and anti HCV in the general population was higher than among blood donors. The same tendency of prevalence of the viruses was reported in previous studies [11,12]. This result may be explained by repeated donation. Indeed donors not only must deny risky behaviors on predonation screening, but they must also have tested negative on their prior donation. Moreover, most habitual donors will not suddenly engage in new high-risk behaviors. Thus, repeated donation excluded individuals with HBV and HCV infection, and thus seroprevalence of HCV in blood donors might have become lower than in the general population.

A regional difference in the seroprevalence of HCV was observed in Tajikistan. Furthermore, the Republic of Tajikistan is subdivided into northern and East-Southern parts. The medical and economic

environment of the East-Southern part of Tajikistan is worse than that of the Northern part. In East-Southern region of Tajikistan, because of political and economic conditions, sterilization of medical equipment and exchange of needles are not perfectly practiced. In contrast, in Dushanbe, the medical environment is of better quality and blood products are well controlled. For these reasons, the seroprevalence of HCV in the general population in Horog was approximately 3 times higher than in Dushanbe.

IVDU are at high risk for HCV infection of needle-sharing. Although the prevalence of the HCV shows geographic variations, the seroprevalence of HCV among IVDU is often higher than 43.2% [10,13]. The seroprevalence of HCV among INDU in Tajikistan was also above, and the highest rate found in the patient group. The high epidemicity of HCV among young IVDU is also a social problem in Tajikistan, and requires urgent intensive and sustained preventive measures. The most effective way to prevent HCV infection in the populations is not yet known. However, the prevention programs, such as syringe distribution, HCV testing, and information on HCV in young IVDU should be considered.

With respect to the age-specific seroprevalence of HCV infection in the low risk group, the seroprevalence of HCV infection increased with age from 4.2% in the 15 to 20 years- olds to the highest rate of 20.0% in the 21-30 years -olds; the seroprevalence then decreased to 5.7% in those over 60.

Among anti-HCV positive individuals in the low risk group, medical treatment was suggested to be risk factor for transmission of HCV. To support this possibility, the seroprevalence of HCV in the 15- 20 year- old which have had few medical treatments, was lower than in other age groups.

Moreover, the seroprevalence of HCV infection among those over 41 years of age dramatically decreased with age. These finding also suggest that HCV infection following medical treatment in the low -risk group might have occurred recently. On the other hand, in the high-risk group, the seroprevalence of HCV infection in the age groups under 40 was high, approximately 30%, and was significantly higher than in other age groups. In this group, drug

abuse was considered as major risk factors for the transmission of HCV. Thus, drug abuse among young generation resulted in the high endemicity of HCV infection in the high-risk group.

With respect to the age-specific seroprevalence of HBV infection in the low risk group, the seroprevalence of HBV was kept low at approximately 12% among all generations. On the other hand, in the high-risk group, the seroprevalence of HBV infection among the 15-to 40 year-old was 2-3 times higher than in the low-risk group.

With respect to HIV infection none of 1.472 subjects in the low risk group, 148 of 1203 (12.3%) subjects in the high-risk group, and 34 of 268 (12.6%) were infected with HIV. Especially, only 15.7% were positive for anti-HIV among IVDU. The seroprevalence of HIV infection in Tajikistan was not much lower than in endemic other countries such as USA and Africa [14,15]. HIV infection is still uncommon in this country.

As suspected from previous indirect measurements, it was demonstrated that the seroprevalence of HBV and HCV is high in Tajikistan. To prevent HBV infection, the Republic of Tajikistan has implemented a universal hepatitis B vaccination program [16-19]. Moreover, sterilization of the medical equipment, screening for the blood-borne viruses in transfusion, and education of medical workers are also urgently required to prevent the transmission of HCV in this country.

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