

## Epidemiological Patterns and Risk Factors of Hepatitis B & C in North-West Iran, Miyandoab City (West Azerbaijan Province)

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**ABSTRACT:** Objective: Hepatitis B virus (HBV) infection remains a major global health problem. This study aimed to describe the epidemiological patterns of hepatitis HBV and HCV and to determine its risk factors in a specific period. Materials and Methods: In this cross-sectional study, data on all patients with positive HBsAg and anti-HCV infection during 2012-2014 were collected by health experts from the registration records at health centre of Miyandoab city. Data were represented by central and dispersion parameters and independent t-test was used regarding the equal variance of independent variables and chi-square test was used for qualitative variables. Results: In total, 101 cases of viral hepatitis HBV and HCV, with an average age 41.30 (SD± 13.95) were studied. The final diagnosis of 74.3% of patients with chronic hepatitis B, 19.8% of acute hepatitis B and 4% hepatitis C diagnosis were found. The most important reason of review in HBsAg positive was "finding asymptomatic subjects with predisposing factors" 20.5% and "voluntary examining" 14%. The first and foremost clinical symptoms leading to visit in surveillance system included: nausea and vomiting 36.6%, abdominal pain 13.9%, respectively. The distribution of exposure history to viral hepatitis HBV and HCV was reported 28.2% in dental cares. Conclusion: The results of this study showed that more patients in voluntary examining and asymptomatic subjects were diagnosed in government agencies. Age above 30 and receiving dental care were the most important risk factors for viral hepatitis HBV and HCV.

### Introduction

This paper provides valuable information on epidemiology patterns and clarifies their roles as risk factors associated with HBV and HCV in Miandoan City, Iran, which help public health policy makers to implement effective strategies to deal with this major health problem.

Viral infection of hepatitis B (HBV) and viral infections of hepatitis C (HCV) are the major public health problem that affects a large proportion of the world's population (1, 2).

According to international studies, two billion people worldwide have been exposed to hepatitis B virus (3, 4). And it is predicted more than a million people die each year from acute and chronic HBV infection, including cirrhosis, fulminant hepatitis, hepato cellular carcinoma (1, 5); also, hepatitis B is the sixth most common cause of liver cancer in the world and third leading cause of death worldwide (6). Among them, about 350-400 million persons, five percent of the world's population (3), are considered the chronic carriers of this virus and are now a source of infection for other people (7). While it is predicted that 200 million persons (i.e. 3.3% of the total world population) are infected with HCV chronic infection (8).

In Iran, about 3% of the population are infected with chronic hepatitis B; so Iran is in groups of countries with moderate prevalence of hepatitis, and about 35% of the Iranian population has the evidence of exposure to HBV infection. In developed countries, the most common reason of HBV transmission is the sexual contact, and in developing countries such as Iran, the mother-to-child transmission is the most common route of transmission (9). However, the horizontal transmission was the most common way of transmission in Iran in recent years in adult (10). In countries with moderate prevalence of HBsAg, the infection occurs in all age groups (11).

Hepatitis B virus is one of the most common causes of acute and chronic hepatitis in adults, as well as cirrhosis and hepatocellular carcinoma in Iran (12). The main way of transmission of hepatitis B and C is blood and blood products (13). Health care workers are on the front line of exposure to blood-borne viruses (HBV, HCV, and HIV). Providers of dental services are at a greater risk of exposure to blood-borne virus worldwide, the prevalence of HBsAg in dentists is 0.6% in USA (14). With increasing age, the prevalence of hepatitis B increases. The highest incidence is between the ages of 50-60; its low prevalence at an early age is due to the success of the vaccination program in the country (11).

Universal immunization program against HBV was performed in more than 100 countries and in recent years has effectively led to a reduction in acute and chronic infection (15, 16). In Iran, in accordance with the recommendations of WHO is Global Group and HB vaccination program, infants were the main goal of EPI program, and the babies were vaccinated with three doses of HB vaccine. The results of several studies in Iran in terms of the vaccination of infants against HB showed that the immunization was very effective and provides very long duration immunity against HB (17, 18). Necessary for the success of any control program can be possible by providing broad and deep and accurate information about the epidemiological situation of the disease in order to implement appropriate strategies to control the disease using modern methods of modelling in each area. So, the aim of this study is to descriptive characteristics and assesses the risk factors related-behaviour associated with HBV and HCV among high risk groups in Miyandiab city (West Azerbaijan province-Iran).

**Material and methods**

This cross-sectional study was conducted during three years from April 2012 to March 2014 in the health centre of Miyandoab city, West Azerbaijan province. The data in this study were based on census records presented at health centre of Miyandoab city and in accordance with standard checklist structured in the health Centres to disease control of hepatitis transmitted of blood by health experts.

**The inclusion criteria in this study include**

All the hepatitis patients referred to health centre of Miyandoab city during the mentioned period. Patients who declared knowingly to record and agree participating and completing the checklists.

**Exclusion criteria of the study include**

Patients diagnosed with other types of hepatitis (other than viral hepatitis) and patients with incomplete information.

The present study had no sampling method, and included all census records presented at health centre of Miyandoab city.

The variables examined in this study include: Demographic information (age, gender, marital status, occupation, place of residence); Immunization history; Clinical characteristics: reason of examination, clinical symptoms, cirrhosis, final diagnosis, history of high risk of behaviours and occupational exposures.

The Mean ( $\pm$  SD) was used to describe the characteristics of patients by quantitative variables with normality default, and qualitative variables are given with frequency (relative frequency).

To investigate the significance of associations between qualitative variables, we used Chi-square test and in case of limitation in the frequency of observations, we used Fishers exact test.; the independent t test was used to compare the mean equality of qualitative variables with default equality of variances.

P-value less than 0.05 were considered as significant. The data in this study were analyzed by SPSS software 19.

The study protocol was reviewed and approved by the ethics committee at the Tabriz University of Medical Sciences. All data related to the patients were also kept confidential.

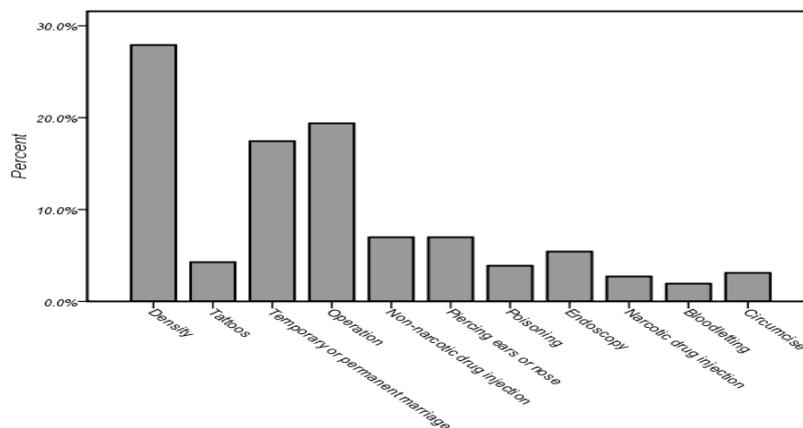


Figure 1: Distribution of exposure in patients with viral hepatitis B and C in Miyandoab city, West Azerbaijan Province (2012-2014)

**Results**

A total of 101 cases of viral hepatitis B and C in a three years period (2012-2014) were studied. The mean age of patients was 41.30 (SD± 13.95), mean age of male cases was 43.00 (SD± 13.96) and female cases 38.09 (SD± 13.55), furthermore there was no statistically significant difference was observed between the mean age of males and females (P-value= 0.07).

Some of the demographic characteristics of patients with hepatitis B and C are presented in Table 1.

Table 1. Some demographic characteristics of patients with hepatitis B, C in Miyandoab city, West Azerbaijan Province (2012-2014)

Variables	Sub-groups	Men	Women	P-value
		frequency (relative frequency)	frequency (relative frequency)	
Age groups	Less than 30	12 (18.2)	17 (48.6)	0.006
	30-45	27 (40.9)	5 (14.3)	
	45-60	19 (28.8)	11 (31.4)	
	Over 60	8 (12.1)	2 (5.7)	
Occupation	Worker	4 (6.1)	-	0.001
	Employee	8 (12.1)	-	
	Freelancer	28 (42.4)	-	
	Farmer	18 (27.3)	-	
	Housewife	-	35 (100)	
Marital status	Others	8 (12.1)	-	0.7
	Single	7 (10.6)	3 (8.6)	
	Married	59 (89.4)	32 (91.4)	
Place of residence	Urban	32 (48.5)	16 (45.7)	1.00
	Rural	34 (51.5)	19 (54.3)	

The final diagnosis: 74 cases (74.3%) with chronic hepatitis B (6 months or more), 20 cases (19.8%) with acute hepatitis B (6 months or less), 4 cases (0.4%) with Hepatitis C. Significant differences between gender and diagnosis of acute and chronic infections were observed (p-value= 0.004).

The first and foremost clinical symptoms leading to visit patients include: 36 (36.6%) nausea and vomiting, 14 (13.9%) abdominal pain, respectively. The total symptoms include 40 cases (58.0%) fever and 29 cases (42.0%) nausea and vomiting. In the population studied, 10 cases (10.1%) of patients were suffering from cirrhosis of the liver.

In the population studied, 9 cases (9.2%) had a history of occupational exposure to blood products. Also, 87 cases (87.9%) did not receive HB vaccine and only 12 cases (12.1%) had a history of vaccination against HB.

Table 2 shows the distribution of causes of HBV and HCV infection in patients as a final diagnosis, which showed that "the examination of asymptomatic subjects with predisposing factors" and "voluntary examining", are among the most common causes of HBV and HCV infection.

According to Figure 1, the distribution of the most important risk factors for blood exposure to hepatitis viral B and C, the history of exposure to dental care and surgery were the most common reasons of exposure to viral hepatitis B and C infection in patients.

Figure 2 showed the incidence of viral hepatitis HBV & HCV in patients referred to the health centre of Miyandoab City.

Table 2: Distribution of frequency for the reasons of diagnosed patients with viral hepatitis B and C in health centre of Miyandoab city, West Azerbaijan Province (2012-2014)

Variables	Frequency (relative frequency)
Symptoms of acute hepatitis	17 (9/9)
A history of intravenous drug users	18 (5/10)
High risk sexual contacts	8 (7/4)
People with infected households	14 (2/8)
Blood or organ donation	21 (3/12)
Voluntary examining	24 (0/14)
Evaluation of asymptomatic patients with predisposing factors	35 (5/20)
Others	34 (9/19)

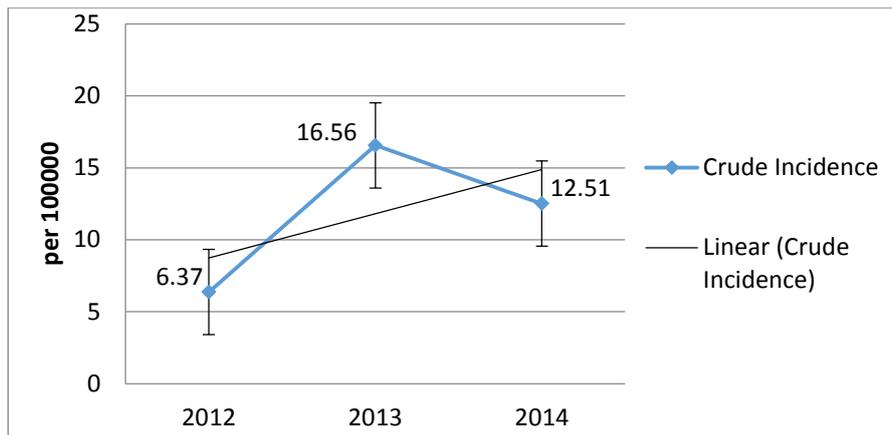


Figure 2: The crude incidence of viral hepatitis B and C in health centre of Miyandoab city, West Azerbaijan Province (2012-2014)

### Discussion

Hepatitis B and C virus infection is a public health problem and the most important causes of morbidity and mortality associated with liver diseases, including cirrhosis and hepatocellular carcinoma which more affects the low and middle income countries (19-21). In Iran, the prevalence of hepatitis B infection is variable between 1.3% to 6.3% in different regions of the country (22). Unfortunately, there are no previous data or the certainty of changes in Sero-epidemiology of HBV and HCV in West Azerbaijan province after the national vaccination program.

The annual cost to recipients in different phases of chronic hepatitis B in Iran was \$ 450 million and \$ 226 million, respectively, in which 64% and 70% of the costs were related to direct payments, and 36% and 30 % also allocated to indirect costs (23). In this study, the prevalence of hepatitis B infection was unexpectedly higher in men. However, studies in Iran and worldwide showed with high strength that the prevalence of HBV and HCV infection in men are higher (9, 10, 24). This is because of the exposure of men with risk factors predisposing hepatitis (22, 25), it seems that men are more likely to exposure chronic infection than women ; which is because of the more exposure to HBV and HCV infection than the confounding role of gender.

According to the data of the present study, no significant difference was observed between the different age groups, and most patients were in the age group over 30 years (P-value= 0.006). In this study, the mean age of patients was 41.30 (SD± 13.95). In epidemiological studies, age is known as the most important risk factor for HBV infection (26). With age, the number of respondents to the vaccine were significantly reduced (P-value= 0.001). This may be the result of a cumulative frequency in the increased high-risk behaviours over time. In the majority of similar studies conducted in Iran, age was a significant determinant in hepatitis. This fact is the result of national vaccination program for young people in the country since 1992; so adults and the elderly population had higher vulnerability to infection with hepatitis (27).

Detection of HBsAg was used as serological markers for monitoring the treatment of infectious HBV, as well as monitoring of active hepatitis or in the passive phase (11). In a study in Turkey in the period from 2000 to 2010, the prevalence of positive HBsAg was decreased from 12.3% to 5% for both genders (28). It seems that this Seroepidemiology reduction of positive HBsAg was the real reduction in the transmission of HBV infection due to vaccination and increased public awareness of the ways of transmission of this infection. But it seems that this was occurred as the result of selection bias.

Proper screening of blood products in the blood bank for infection with hepatitis B, and high vaccination coverage for high-risk groups, such as dialysis patients and health care workers may be effective in the low incidence of this infection in these groups. Khedmati et al in 2007 reported that the prevalence of HBsAg in the donor blood products was 0.487% (29). In Merat study based on a population-based study in Iran, the prevalence of HBsAg and core antibody of hepatitis B was 2.6% and 16.4, respectively. The predictors of prevalence of HBsAg and core antibody of hepatitis in a multivariate analysis included older age, lower educational level, rural residential place, and liver disease (30).

According to the present study, the history of exposure to dental care and surgery were the most common reasons of exposure in patients infected with viral hepatitis B and C. In Keyvani study on 1264 patients with HBV, positive family history of hepatitis in the family, dental surgery, blood transfusion and marriage were recognized as risk factors for this infection (27). In a study in Kermanshah province, a multivariate analysis showed that age, gender, history of tattoos and dental services were reported as important and independent risk factors for HBV infection for susceptibility and vulnerability in 10 to 14% of patients with prior history of dental Services (9). Dentists and dental surgeon are more infected with HBV and can transmit the virus to their patients, more than any other professional groups (31, 32). HBV infection is known as an occupational hazard in countries with low and middle income level (33). Due to socio-economic status and lifestyle in rural areas, is also involved.

Likewise, the high risk populations for HBV and HCV infections are blood donors, addicts, haemodialysis, tattooing, prisoners, length of duration of medical services and dental care (34). The prevalence of HBV infection among

dentists, regardless of endemic HBV infection, considering the general population is high (31). In Iran, the coverage of hepatitis B vaccination program among dentists is varied between 74.8% and 94.9%; on average, 70% of dental service providers have received at least one dose of hepatitis vaccine (35). The response to hepatitis B (i.e. antibody levels above 10 IU/ml) in the dental service providers in studies in Iran was varied about the 89.2% to 94.4% in recipients of hepatitis B vaccine with one to three doses (26, 35, 36).

In the present study, 74.3% cases with chronic hepatitis B, 19.8% acute hepatitis B and 4.0% with hepatitis C were diagnosed. In a study in North Khorasan province in Iran, 15.7% had chronic infection. The results of some studies showed the prevalence of chronic hepatitis B in adults about 6-10% (4). In addition, the risk for cirrhosis and Hepatocellular carcinoma increases with increasing age, which imposes the heavy financial burden on the health care system (9).

According to the present study, the prevalence of viral hepatitis B and C infection was higher in rural areas. The prevalence of HBsAg in rural areas was about 2 times more than urban areas (37). In the study of Hayatbakhsh et al in South-Eastern part of Iran, the prevalence of surface antigen of hepatitis B (HBsAg), surface antibody levels of hepatitis B (anti-HBs), and core antibody of hepatitis B (anti-HBc) were 1.1%, 47.6% and 8.9%, respectively (38). It seems that low socio-economic status of rural areas than in urban areas and also lower incidence of high-risk behaviour such as intravenous drug users in the community in the Islamic Republic of Iran, as a result of population growth in the suburban areas still cannot be a risk factor in urban areas like rural areas which have more non-sterile dental services.

Population-based epidemiologic studies on HCV are lower in frequency in comparison those conducted on HBV in Iran (12). The prevalence of HCV infection among injecting prisoners compared to the general population of the country is very high (30% vs. 0.2%) (39). People at higher risk for HCV infection include health care workers, recipients of medical services, injecting drug and alcohol users, and prostitutes, respectively (33). According with recent studies finding on the proportion of HCV infection in special populations in Iran; the prevalence HCV infection among blood donors was reported to be from 0.25% to 0.13% (40), for IV drug users 11-52% (41), and for patients on haemodialysis 11-25% (42).

Rezaie et al in the meta-analysis study on the effectiveness of the HBV national vaccination program reported that a total of 80% of the recipients of the vaccine containing antibodies (>10 IU/ml) compared with 20% without antibodies were necessary (43). A study on the effectiveness of vaccination on infants against HB showed that after 20 years of vaccination, approximately 44% of vaccine recipients had high antibody titer and only 3.53% had immunological failure (<10 IU/ml) (38).

## **Conclusion**

The results indicated that more patients were diagnosed in the studies of asymptomatic subjects in voluntary examining and government agencies. Age more than 30 and recipients of dental care were the most important risk factors for viral hepatitis HBV and HCV.

## **Limitations of study**

There are several limitations on this study. Given the retrospective nature of the present study and in accordance with the structured checklist used for data collection, some patient information may be incomplete and have surveillance bias and recall bias which is all the information bias. Also, the data in this study may have selection bias that included the cases from a certain age groups of society.

## **Ethical issues**

Written informed consent was obtained from the patients.

## **Conflict of interests**

The authors declare no conflict of interests.

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