

## Original Article

# High Prevalence of Hepatitis C Infection among High Risk Groups in Kohgiluyeh and Boyerahmad Province, Southwest Iran

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See the pages: 268

## Abstract

**Background:** Detection of Hepatitis C virus (HCV)-infected people in each community assists with infection prevention and control. This study aims to evaluate the prevalence of HCV infection among high risk groups in Kohgiluyeh and Boyerahmad Province, Southwest Iran.

**Methods:** This was a cross-sectional study conducted from 2009-2010 in Kohgiluyeh and Boyerahmad Province. High risk groups for HCV were the subjects of this study. Blood samples were taken from 2009 individuals at high risk for HCV that included inmates, injecting drug users (IDUs), health care workers, patients on maintenance hemodialysis, hemophilic patients, and those with histories of blood transfusions. Patients were residents of Yasuj, Gachsaran, and Dehdasht (3 main townships in the province). Samples were analyzed by ELISA for anti-HCV antibodies. Demographic features of participants were recorded by a questionnaire during sample collection. Data were analyzed by SPSS version 13 software.

**Results:** Of 2009 subjects, HCV antibodies were detected in 172 (8.6%). Rate of infection was higher in males (11.4%) compared to females (3.2%). Rate of infection in inmates was 11.7% while this rate was 42.4% in IDUs, 4.2% in health care workers, and 6.1% in thalassemic patients. Significant correlation was found between HCV infection, history of imprisonment, and thalassemia.

**Conclusion:** Results of this study have provided epidemiologic features of HCV and its risk factors in Kohgiluyeh and Boyerahmad Province, Southwest Iran. This information may assist in preventing the spread of HCV infection in this and other similar settings in the region. The findings of this study may help in improving surveillance and infection control in the community through management and monitoring of infected individuals.

**Keywords:** HCV, high risk group, Iran, prevalence, seroprevalence

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## Introduction

Hepatitis C is a global health problem affecting more than 170 million people worldwide.<sup>1</sup> Hepatitis C virus (HCV) is mainly transmitted parenterally or in the course of blood contamination during medical procedures.

Most who acquire acute HCV infection have no symptoms or have a mild clinical disease. However, chronic HCV infection develops in 75% – 85% of those acutely infected individuals.<sup>2</sup> HCV-infected people serve as a reservoir for transmission of the infection to others, including health care workers.

It has been estimated that HCV accounts for 27% of cirrhosis and 25% of hepatocellular carcinoma (HCC) worldwide. HCV is a leading cause of liver failure and liver transplantation in adults.<sup>2</sup>

In Iran, it has been estimated that between 0.12% – 0.89% of the general population have anti-hepatitis C virus antibodies,

which corresponds to as many as 0.5 million chronic carriers.<sup>3</sup> A higher seroprevalence of HCV has been reported in special groups (homeless or gypsies) in Iran.<sup>4,5</sup> The infection is emerging mostly due to the problem of intravenous drug abuse and needle-sharing in this country.

In a recent population-based study by Merat et al. male sex, history of intravenous drug abuse, and imprisonment were attributed to HCV infection.<sup>3</sup>

Injection drug users (IDUs) constitute the largest group of persons at high risk for acquiring HCV infection in developed countries. The range of HCV infection among IDUs in Iran has been reported to be 38% to 47%.<sup>6-8</sup>

It is essential to assess the magnitude of HCV infection in each region of Iran. This assessment will assist health authorities in improving surveillance and prevention of HCV infection in the community through management and monitoring of infected individuals.

High-risk populations for HCV infection are individuals involved in activities that include possible contact with contaminated blood, such as blood transfusions, medical or dental care, acupuncture and tattooing, IDUs, prison inmates, and healthcare workers. This study aims to evaluate the epidemiologic features of HCV and its risk factors among high risk groups in Kohgiluyeh and

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**Table 1.** Demographic characteristics of participants.

Features	Frequency	Percent
<b>Place of residence</b>		
Gachsaran	803	40
Yasuj	802	39.9
Dehdasht	404	20.1
<b>Sex</b>		
Male	1231	66.4
Female	621	33.6
<b>Marital status</b>		
Single	692	39.7
Married	1047	60.3
<b>High risk groups</b>		
Inmates	616	30.6
Health care workers	212	10.5
Injecting drug users (IDUs)	158	7.8
Thalassemic	49	2.4
Other†	602	30
<b>Age group (years)</b>		
1–20	166	9.5
21–30	691	39.6
31–40	472	27.1
> 40	415	23.8
Missing	265	-

† Tattooing, history of surgery, dental care, having HCV-positive family member(s).

**Table 2.** High-risk groups and HCV prevalence.

High-risk groups	Frequency	HCV-positive	Percent
Inmates	616	72	11.7
Health care workers	212	9	4.2
Injection drug users (IDUs)	158	67	42.2
Thalassemic	49	3	6.1
Others†	602	47	7.8

† Tattooing, history of surgery, dental practice, HIV-positive family members.

**Table 3.** Risk factors associated with HCV seropositivity in high risk groups in Kohgiluyeh and Boyerahmad Province, Southwest Iran.

Risk factor	HCV positive	HCV negative	Total
History of imprisonment	72	544	616
History of drug use	67	91	158
Transfusion	2	46	48
Needle stick	9	213	222
Thalassemia	3	46	49
Unprotected sex	6	12	18
Other†	47	555	602

† Tattooing, history of surgery, dental practice, having HCV-positive family members.

Boyerahmad Province, Southwest Iran, where such data are not currently available.

## Materials and Methods

This descriptive cross-sectional study was conducted from 2009 – 2010 in Kohgiluyeh and Boyerahmad Province, Iran. High risk groups for HCV were the subjects of this study. After obtaining approval from the Ethics Committee of Yasuj University of Medical Sciences, blood samples were taken from 2009 individuals who were residents of Yasuj, Gachsaran, and Dehdasht (3 main townships in the province) that were at high risk for acquiring HCV. Participants were comprised of inmates (total inmates in 3 main prisons in the province: 616), IDUs (158) health care workers

(222 in the 3 main townships, based on the population of health care workers in each township), and thalassemic patients (49). Participation in this study was voluntary and all participants were counseled about the study. Participants were requested to provide signed informed consents. Confidentiality of the details of the participants was guaranteed.

Demographic features of participants were recorded using a questionnaire during sample collection. The questionnaire contained detailed questions regarding HCV-related risk behaviors such as injection of intravenous drugs, history of imprisonment, having received blood and/or blood products, unsafe sexual practice, and history of other risk factors such as receiving tattoos, body piercing, and history of surgery or dental care.

A total of 5 ml of blood was taken from each subject and sera

**Table 4.** Association between HCV positivity and risk factors in high risk groups in Kohgiluyeh and Boyer-Ahmad Province, Southwest Iran.

High risk behavior	Df	Sig	Odds ratio	95% CI for Exp (B)	
				Lower	Upper
History of drug use	1	0.105	1.603	0.906	2.838
Thalassemia	1	0.000	3.761	1.909	7.409
Transfusion/ hemophilia	1	0.907	1.101	0.221	5.487
Needle stick	1	0.389	1.538	0.577	4.101
History of imprisonment	1	0.033	8.231	1.191	56.884

were tested for anti-HCV antibodies by an enzyme-linked immunosorbant assay (ELISA, DIALab, Austria). The sensitivity of this test (a third generation ELISA) is 99.55% and specificity is 99.79%.

Collected data were analyzed by SPSS version 13 software. Standard  $\chi^2$  test was used to assess the univariate correlation of demographic and behavioral variables and HCV seropositivity.

## Results

Of 2009 subjects, 802 (39.9%) were from Yasuj, 803 (40%) were from Gachsaran, and 404 (20.1%) were from Dehdasht. Males constituted 66.4% of subjects whereas 33.4% of participants were female. Most subjects (39.6%) were among the 21 – 30 year-old age group and most were married (60.3%). Table 1 shows the demographic characteristics of participants in this study.

HCV antibodies were detected in 172 (8.6%) cases. Rate of infection was higher in males (11.4%) compared to females (3.2%).

Rate of infection in inmates was 11.7% while this rate was 42.4% in IDUs, 4.2% in health care workers, and 6.1% in thalassemic patients. The highest prevalence of HCV (9.3%; 64/691) was found in the 21 – 30 year-old age group. Table 2 represents the prevalence of HCV infection in each high risk group in this study. Unemployed people were found to be the main victims of this disease. Significant correlation was found between marital status and HCV seropositivity. The rate of seropositivity in unmarried subjects was 11.4% compared with 6.4% for married individuals ( $P < 0.05$ ).

Significant correlation was found between HCV seropositivity and sex (more common in males), history of imprisonment, drug addiction, level of education (more common in illiterate and less educated subjects) and place of residence (more common in Gachsaran). No significant correlation ( $P > 0.05$ ) was found between HCV seropositivity and age, history of needle stick, and employment. Table 3 shows the risk factors which might be associated with HCV seropositivity in this study. Multivariate analysis, using backward selection logistic regression, revealed a correlation between history of imprisonment, thalassemia and HCV positivity. Table 4 shows the details of this correlation.

## Discussion

Approximately 3% of the world's population are infected with HCV.<sup>1</sup> The high risk groups for HCV infection are those who practice activities such as blood transfusions, medical or dental care, acupuncture and tattooing, IDUs, imprisonment, and health care workers. HCV-positive individuals might expose their friends, families and general community to HCV infection. In this study we have evaluated the seroprevalence of HCV in high risk groups

in Kohgiluyeh and Boyer-Ahmad Province. The study was justified by the lack of information about HCV infection in this area.

Prevalence of HCV antibody positivity among all participants of this study was 8.6%. Findings of this study demonstrated a relatively high prevalence of HCV in this area. Since the recruited subjects of this study were from selected high risk groups, therefore the rate of HCV in the entire population of the district might be different. Because of religious beliefs and possible lack of co-operation in answering questions related to sexual behaviors, many individuals did not properly answer this question. Such data was not considered in the statistical analysis. Self-reporting of behaviors such as sexual activity and drug use are other limitations of this study.

It is worth mentioning that the seropositivity of HCV does not mean HCV infection since spontaneous resolution of HCV might occur in HCV-infected individuals. In such cases ELISA results are positive but the patient is not HCV-infected.

Despite the low HCV seroprevalence in the Iranian general population, recent studies have shown a high prevalence of HCV infection among Iranian prisoners. Of 460 inmates in a prison in Guilan, 45.4% were HCV antibody positive.<sup>7</sup> In our study the rate of seropositivity in prisoners was lower (11.6%). Participants who spent more time in prison were significantly more likely to be positive for antibodies to HCV in our study. The current study found a positive correlation between being in prison and HCV seropositivity. Such connection has been reported in a study by Alizadeh et al. of prisoners in Hamedan, Iran where they reported a prevalence of 30% for HCV antibodies.<sup>9</sup>

The overall seroprevalence of HCV among Iranian blood donors has been estimated to be 0.12%.<sup>10</sup> The prevalence of anti-HCV antibodies among 7897 healthy voluntary blood donors in Shiraz, Iran was 0.59% in 1998.<sup>11</sup> This approximated the frequency of anti-HCV recently reported in a population-based study in Iran.<sup>3</sup> Khedmat et al. reported a frequency of 2.07% for anti-hepatitis C among Iranian blood donors in 2009.<sup>12</sup> In our study, 4.1% of patients who had a history of transfusion were positive for anti-HCV antibodies.

The prevalence of HCV infection in hemophilic patients in Iran has been reported to be 15.6% in Fars, 44.3% in Kerman, 29.6% in Zahedan, 59.1% in Hamadan, 71.3% in Guilan, and 76.7% in Northwest Iran. The overall estimate of HCV in these patients in the entire country is estimated to be 50%.<sup>6,13–15</sup> In our study the numbers of hemophilic patients were too few to draw any conclusion about prevalence of HCV in this high risk group in the region.

Thalassemic patients are at high risk for hepatitis C infection; 19.3% in 732 patients with beta-thalassemia from 5 provinces of Iran have been reported to be infected with HCV.<sup>16</sup> In our study 6.1% of thalassemic patients were HCV-positive.

HCV infection is a significant health problem in dialysis units

in Iran. Seroprevalence of hepatitis C in hemodialysis patients in Guilan, northern Iran was reported to be 24.8%.<sup>17</sup> Recent studies have reported a decline in prevalence of HCV in hemodialysis patients in Iran from 14.4% in 1999 to 4.5% in 2006.<sup>18</sup> It has been shown that blood transfusion and duration of dialysis treatment are important risk factors for HCV infection in patients on maintenance hemodialysis. The more units transfused, the higher the risk for HCV infection.

There is a wide range of HCV infection, 2–100%, in IDUs in different parts of the world.<sup>19</sup>

The findings of the current study have shown that 42.4% of IDUs are infected with HCV; thus they are a very important reservoir for the spread of HCV to others in the community. Alavi et al. have reported a higher seroprevalence of HCV (52.11%) in IDUs in Ahvaz, Iran.<sup>20</sup>

In conclusion, the findings of the present study have provided epidemiologic features of hepatitis C and its risk factors in Kohgiluyeh and Boyer-Ahmad Province in Southwest Iran. This information contributes to our understanding of the worldwide prevalence of hepatitis C and may help to contain the spread of HCV infection in this and other similar settings in the region. The findings of this study may assist in improving surveillance and prevention of HCV infection in the community through management and monitoring of infected individuals.

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