

Hepatitis C Seroprevalence and Risk Factors in Adult Population of Chaharmahal and Bakhtiari Province of Iran in 2013

MASOUMEH MOEZZI¹, REZA IMANI², ALI KARIMI³, BEHROUZ POURHEIDAR⁴

ABSTRACT

Introduction: Hepatitis C is the second leading viral infectious disease worldwide. In Iran, hepatitis C is the most important and prevalent reason for chronic hepatitis and liver cirrhosis in the multi transfused population.

Aim: This study was conducted to determine seroprevalence and burden of hepatitis C in Chaharmahal and Bakhtiari province and to plan for controlling it.

Materials and Methods: For this analytical, population-based study, 3000 samples older than 15 years old were enrolled from urban and rural areas of Chaharmahal and Bakhtiari province, southwest Iran per cluster sampling. Written informed consent was obtained from the participants and the demographic data, transmission route and risk factors were collected after blood sample taking. Hepatitis C virus antibody (HCV Ab) and western blotting were consecutively run.

Statistical Analysis: Data analysis was done by SPSS 19 using descriptive statistics, and chi-square test, Fisher's exact test, and logistic regression. A *p* value of 0.05 was considered as the level of significance.

Results: The prevalence of HCV Ab was obtained 1.4% (95% CI, 0.95-1.7) and that of positive hepatitis C by western blotting 0.9% (95% CI, 0.65-1.3). The prevalence in men (1.2%) was obtained two times higher than women. The highest prevalence was obtained in 35 to 44-year-old population (2%). The prevalence was higher in married individuals and less in higher educated. History of hospital stay, first degree relatives infected with HCV, jaundice, history of blood transfusion, tattoo, outpatient surgery, imprisonment, contact with the infected, intravenous (IV) drug abuse, and smoking had significant association with disease prevalence (*p*<0.05). The highest odds ratio was obtained for history of IV drug abuse (OR=38.2, 95% CI, 14.06-103.9) followed by imprisonment (OR=8.9, 95% CI, 2.97-26.6). However, by logistic regression only history of IV drug abuse was obtained as significant (*p*<0.05).

Conclusion: Hepatitis C is growing and emerging as the most prevalent chronic, viral hepatic disease, so further consideration of risk factors and routes of transmission is crucial for appropriate planning for, and preventing, treating, and controlling hepatitis C. IV drug abusers as the most important group need special consideration and surveillance in order to cut infection chain and decrease the disease incidence.

Keywords: Antibodies, Seroepidemiologic studies, Viral infectious disease

INTRODUCTION

Hepatitis C, after hepatitis B, is the second leading viral infectious disease worldwide and its significance relates to the development of hepatic diseases and the associated complications [1]. The prevalence of hepatitis C is about 3% globally and the number of infected individuals is estimated about 130-170 million [1-4]. This virus is the most prevalent reason for chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma in North America, Europe, and Japan and the most important reason for liver transplantation in the United States [5,6].

In Iran, hepatitis C is the most important and prevalent reason for chronic hepatitis and liver cirrhosis in the multi transfused population (thalassemia, hemophilia, and hemodialysis). Prevalence of hepatitis C is much less than hepatitis B in Iran, so that 0.3% of volunteer blood donors (compared with 4% in Egypt, 2.2% in Japan, and 1.4% in Africa) and less than 10% of the patients with chronic hepatitis or liver cirrhosis in their serum in Tehran, were eligible for anti-hepatitis C virus antibodies (HCV Abs) [5]. In most developed countries prevalence is under 1%, but in Asian countries the prevalence is higher. For example, the prevalence of hepatitis C was reported 0.3% in Germany [7], 0.06% in North America [8], 2.4% in Lithuania [9], 1.2% in Brazil and Libya [10,11], 5.2% in India [12], and 4.8% in Pakistan [13]. In Iran, most studies have been conducted on high risk populations; the prevalence of hepatitis C was reported 11-25%

in hemodialysis patients, 11-52% in intravenous (IV) drug abusers, and 15-76% in hemophilia and thalassemia patients [5,14-17].

The study of blood donors in Iran from 2004 to 2007 reported the prevalence 0.13% [18] and the prevalence in blood donors in Shahrekord, capital of Chaharmahal and Bakhtiari was reported 0.6% [19]. However, the prevalence estimated for Iran general population was less than 1%, which is less than the countries of the region [5]. Some recent, population-based studies confirm this finding. The findings of these studies represent the difference in population prevalence among different provinces and regions of Iran, which could be attributed to the contribution of lifestyle, and cultural and ethnicity-related conditions to hepatitis C prevalence and the associated risk factors [20-22]. Regarding these differences and the limited number of population-based studies on prevalence of hepatitis C, and the necessity of conducting such investigation in Chaharmahal and Bakhtiari to study the prevalence and risk factors of this disease in the community, this population-based study was conducted, following the recommendation of the University Committee of Hepatitis, to determine the burden of disease and to plan for controlling the infection and disease.

MATERIALS AND METHODS

In this analytical, population-based study, adults over 15 years old in urban and rural areas of Chaharmahal and Bakhtiari comprise the sample population. With confidence interval 95%, relative error

25%, and 800000-individual population of the area under study, 3000 individuals were enrolled. The method of sampling was clustered, consisting of 50 60-individual clusters (32 urban, 18 rural). The inclusion criteria were 15 years and older, and consent to participate. The written consent to enter into the study was obtained from the participants to fill out the questionnaire, to take blood sample, and generally to observe research ethics. This study has ethics code of 90-2-6/1 of Ethics Committee of the University. Notably, the sample considered in the present study is similar to another study simultaneously approved with similar protocol and ethics code [23].

Three separate teams were formed for interview, blood sample taking, and laboratory to implement the study. Firstly, interview team referred houses, explained the purpose of the research project, and questioned the presence of qualified individual(s) in the house. If the answer was yes and the individual was consent to participate, the researchers asked him/her to fill out the questionnaire. For seroprevalence of hepatitis, two consecutive tests, HCV Ab and western blotting were used. By this way, to confirm the test, positive HCV Ab samples were further investigated by western blotting and the confirmed samples by western blotting were considered as hepatitis C-positive. HCV-Elisa was run with Dia-Pro kit (Italy) and western blotting with MP kit.

STATISTICAL ANALYSIS

Having entered the data into SPSS19 software, we did data analysis using descriptive parameters, and chi-square and Fisher's exact test, and then significant factors in univariate analysis were entered into logistic regression model to eliminate probable confounding factors. The level of significance was considered 0.05.

RESULTS

Mean age of the participants was 38.4±16.3 (range: 15-90) years old. 63% were female and 75% married. Initially, 40 of 3000 were HCVAb-positive and after running western blotting, HCVAb-positive cases declined to 27. Therefore, the prevalence of HCVAb was obtained 1.4% (95% CI, 0.95-1.7) and positive hepatitis C prevalence by western blotting was 0.9% (95% CI, 0.65-1.3).

The highest prevalence was obtained in Kiar and Ardal Counties (respectively 2.08% and 1.66%) and no positive western blotting was derived in Lordegan and Farsan [Table/Fig-1]. The prevalence in men was obtained 1.2%, two times higher than the prevalence in women. The highest prevalence (2.12%) was obtained in 35-44 years old population followed by 25-34 years old (0.9%) and 45-54

	Total Number	Positive Cases No. (Western blotting)	Prevalence (%)	p-value a Chi-Square
County				0.08 (Fisher's Exact Test)
Shahrekord	1680	15	0.89	
Boroujen	420	5	1.19	
Farsan	120	0	0	
Lordegan	300	0	0	
Ardal	60	1	1.66	
Kouhrang	180	1	0.55	
Kiar	240	5	2.08	
total	3000			
Missing*	0			
Gender				0.08
Male	1111	14	1.26	
Female	1889	13	0.68	
total	3000			
missing	0			

Age, years				0.01
15-24	708	3	0.42	
25-34	766	7	0.91	
35-44	518	11	2.12	
45-54	456	4	0.87	
55-64	384	3	0.78	
>64	161	0	0	
Total	2993			
Missing	7			
Marital status				0.3
Single	717	4	0.55	
Married	2125	23	1.08	
Divorced/Widow	136	0	0	
Total	2978			
Missing	22			
Ethnicity				0.04
Fars	1549	19	1.22	
Turk	482	0	0	
Lor	904	8	0.88	
Total	2935			
Missing*	65			
Residence				1
Urban	1847	15	0.81	
Rural	1068	8	0.74	
Nomadic	5	0	0	
Total	2920			
Missing	80			
Occupation				0.1 (Fisher's Exact Test)
Civil Servant	151	3	1.98	
Non-Public	506	8	1.58	
Student	340	0	0	
Soldier	12	0	0	
Housewife	1495	12	0.80	
Retired	102	1	0.98	
Jobless	278	3	1.07	
Farmer and poulterer	92	0	0	
Total	2976			
Missing*	24			
Education				0.1
Illiterate	629	6	0.95	
Able to read	1069	12	1.12	
Diploma and above	1010	6	0.59	
MA/MSc and above	268	1	0.37	
Total	2976			
Missing*	24			

[Table/Fig-1]: Prevalence of hepatitis C for demographic characteristics
 a At 0.05 level, p is significant
 * Some items in questionnaire were not completed by all the participants

years old (0.8%) populations. The prevalence in married individuals was obtained 1.22%, two times higher than the prevalence in single individuals. The prevalence in Fars ethnicity (1%), civil servants (1.9%), non public occupations (1.58%), and the jobless (1.07%) was higher than others. The prevalence in cities (0.8%) and villages (0.7%) was approximately similar. For education, the highest prevalence was obtained in those able to read and the illiterate (1%) and as the education grew higher, the prevalence decreased [Table/Fig-1].

Risk factor	Total Number	Positive Cases Number	Prevalence%	OR a	CI	p-value b Chi-Square
Hospitalization History						0.02
Yes	1595	19	1.19	6.7	1.06-4.3	
No	1344	6	0.44			
Total	2939					
Missing*	61					
Jaundice History						0.04
Yes	43	2	4.65	6.3	1.43-27.7	
No	2868	22	0.76			
Total	2911					
Missing*	89					
First degree relative, infected with virus						0.04
Yes	93	3	3.22	4.1	1.2-13.9	
No	2871	23	0.80			
Total	2964					
Missing*	36					
Transfusion history						0.03
Yes	72	3	4.16	5.42	1.59-18.5	
No	2894	23	0.79			
Total	2966					
Missing*	34					
Tattoo						0.002
Yes	307	9	2.9	4.68	2.06-10.5	
No	2651	17	0.64			
Total	2958					
Missing*	42					
Outpatient surgery history						0.002
Yes	514	11	2.1	3.55	1.62-7.7	
No	2450	15	0.61			
Total	2964					
Missing*	36					
Contact with the Infected						0.01
Yes	120	4	3.3	4.6	1.55-13.7	
No	2824	21	0.74			
Total	2944					
Missing*	56					
Imprisonment						0.002
Yes	63	4	6.3	8.9	2.97-26.6	
No	2912	22	0.75			
Total	2975					
Missing*	25					
IV Drug Abuse						0.005
Yes	29	6	20.68	38.2	14.06-103.9	
No	2952	20	0.67			
Total	2981					
Missing*	19					
Smoking						0.03
Yes	417	13	3.1	6.26	2.8-13.6	
No	2545	13	0.51			
Total	2962					
Missing*	38					

[Table/Fig-2]: Prevalence of hepatitis C for risk factors

^a Abbreviations: OR, odds ratio; CI, confidence interval.

^b At 0.05 level, p is significant.

* Some items in questionnaire were not completed by all the participants

Chi-square indicated that out of the risk factors and the factors contributing to the transmission, history of hospital stay and jaundice, first degree relatives infected with HCV, and history of blood transfusion, tattoo, outpatient surgery, contact with hepatitis-infected individuals, imprisonment, intravenous (IV) drug abuse, and smoking were significantly associated with the disease prevalence. The highest odds ratio was obtained for history of IV drug abusers (OR=38.2, 95% CI, 14.06-103.9) followed by imprisonment (OR=8.9, 95%CI, 2.97-26.6) [Table/Fig-2]. However, by logistic regression (enter model), out of the above factors, only history of IV drug abuse was obtained as significant ($p < 0.05$).

DISCUSSION

In this study, the prevalence of HCV Ab was obtained 1.4% and that of positive hepatitis C by western blotting was obtained 0.9% in Chaharmahal and Bakhtiari. The prevalence of hepatitis C has been already studied in high risk populations, but few studies have been conducted as population-based. A population-based study investigated prevalence of hepatitis C in three provinces in northern, central, and southern Iran; the general prevalence was reported 0.5%, and the prevalence in Golestan 1%, in Tehran 0.3%, and in Hormozgan 1.6% [20]. In a population-based study in Amol (Mazandaran province), the prevalence of hepatitis C was obtained 0.05% [21], and in another study in Zahedan 0.5% [22].

By the findings of a study, the prevalence of hepatitis C, similar to hepatitis B, was heterogenous and varied depending on cultural, ethnicity-related conditions and lifestyle among provinces [24]. Although the population-based prevalence of hepatitis B in Chaharmahal and Bakhtiari has been already obtained 1.3% [24], which is lower than national prevalence, but hepatitis C prevalence was higher than the general, national prevalence obtained in Merat et al., study [20]. Therefore, it seems that hepatitis C is being replaced as and turned into the most prevalent chronic, viral hepatic disease, which highlights greater emphasis on and necessity of appropriate planning for preventing, treating, and controlling it. This has been already confirmed by some studies in Iran and other countries [8,20].

In the present study, the prevalence was twice higher in men than women, which is consistent with most studies in Iran and other countries, and possibly attributable to more risk factors in men. The highest prevalence was obtained in 35-44 years old population followed by 25-34 years old and 45-54 years old populations. In similar studies, the prevalence was higher in older populations, as well [8-12]. The prevalence was obtained higher in married individuals than single, and lower in Turk and Lor populations than Fars. This could be due to different lifestyle and less frequent high risk behaviors. Study of the association between ethnicity and hepatocellular carcinoma could be helpful in this regard.

The occupations most involved were non-public, civil servants, and jobless. The prevalence was not much different between cities and villages. In a study in Pakistan, the prevalence was obtained higher in 20-49 years old population and was not different between men and women. The prevalence has been already reported higher in married individuals, the individuals with public and outside home occupations and low socioeconomic status [13], consistent with the present study. The prevalence was higher in the individuals with the education level lower than diploma. In other similar investigations, consistent with the present study, the prevalence was less in the individuals with higher education [8-13], which is due to enhanced knowledge, attitude, and practice in these individuals.

Out of the risk factors and the factors contributing to the transmission, hospital stay history, first degree relatives infected with HCV, and history of blood transfusion, tattoo, outpatient surgery, contact with hepatitis-infected individuals, imprisonment, IV drug abuse, and smoking were significantly associated with disease prevalence, which is consistent with other studies [5-20]. However, by logistic

regression, only history of IV drug abuse was yielded as significant. Probably, imprisonment and smoking were not significant in the model due to association with IV drug abuse. In study of Iran's three provinces, imprisonment and IV drug abuse were the main factors in the model [18]. In study of Amol, Mazandaran province, unsterile puncture and infection in first degree relatives were obtained as the main risk factors in the model [19], but in study of Zahedan, none of the risk factors were obtained as significant in multivariate analysis [20]. In this province, the highest odds ratio was obtained for IV drug abuse, so IV drug abuse seems to be the main factor. But, difference in ethnicity and probable effect of lifestyle should be considered, as well.

CONCLUSION

It seems that hepatitis C is growing as the most prevalent chronic, viral hepatic disease. Further consideration of risk factors and routes of infection transmission is crucial for appropriate planning for, and preventing, treating, and controlling hepatitis C. IV drug abusers as the most important group need special consideration and surveillance in order to cut infection chain and decrease the disease incidence.

ACKNOWLEDGEMENTS

This paper was derived from a research project (no. 985), funded by Deputy of Research and Technology of Shahrekord University of Medical Sciences and conducted with cooperation of Deputy of Health of this University.

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PARTICULARS OF CONTRIBUTORS:

1. Faculty, Department of Community Medicine, Shahrekord University of Medical Sciences, Shahrekord, IR Iran.
2. Faculty, Department of Infectious Diseases, Shahrekord University of Medical Sciences, Shahrekord, IR Iran.
3. Faculty, Department of Microbiology, Shahrekord University of Medical Sciences, Shahrekord, IR Iran.
4. Central Disease Control Unit, Shahrekord University of Medical Sciences, Shahrekord, IR Iran.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Masoumeh Moezzi,
Faculty, Department of Community Medicine, Faculty of Medicine, Rahmatiyeh, Shahrekord, IR Iran.
E-mail: Imoezzi@yahoo.com

Date of Submission: **May 26, 2015**Date of Peer Review: **Jun 18, 2015**Date of Acceptance: **Jul 11, 2015**Date of Publishing: **Oct 01, 2015****FINANCIAL OR OTHER COMPETING INTERESTS:** As Declared above.