Infect Epidemiol Med. 2016 Summer; Volume 2, Issue 3: 28-30 DOI:10.7508/iem.2016.03.007
Published online 2016 Summer **Original Article**

Seroprevalence of HCV Infection among Health Care Workers in Two Teaching Hospitals, Tehran, Iran

Mahshid Talebi-Taher[1,2]*, Sahar Rismantab[3], Siamak Khaleghi[4], Hossein Keyvani[5], Mitra Barati[6], Siamak Soltani[7]

[1]Antimicrobial Resistance Research Center, Rasoul-e-Akram Hospital, Iran University of Medical Sciences, Tehran, IR Iran
[2]Infectious diseases department, Iran University of Medical Sciences, Tehran, IR Iran.
[3]Internal medicine department, Iran University of Medical Sciences, Tehran, IR Iran.
[4]Gastroenterologist, Internal medicine department, Iran University of Medical Sciences, Tehran, Iran.
[5]Department of virology, Iran University of Medical Sciences, Tehran-Iran.
[6]Pediatric infectious diseases research center, Infectious diseases department, Iran University of Medical Sciences, Tehran-Iran.
[7]Forensic medicine department, Iran University of Medical Sciences, Tehran-Iran.

*Corresponding author: Mahshid Talebi-Taher, MD, MPH, Professor in infectious disease. Rasoul-e-Akram General Hospital, Sattarkhan, Niayesh st., Tehran-Iran, Phone number: +98-21-66507056, 09123835372, Fax: +98-21-66506864, Email : mtalebitaher2000@yahoo.com

Submitted: June 10, 2015; **Revised:** January 11, 2016 **Accepted:** January 17, 2016

Background: Health care workers (HCWs) are at the risk of the acquisition of occupational transmissible diseases. Controversial results have been reported about hepatitis C virus (HCV). The main objective of the recent study was to evaluate the seroprevalence of HCV and its relationship to the occupational history and exposure of HCWs in two teaching hospitals in Tehran-Iran.
Materials and Methods: A seroprevalence survey of HCV was conducted using serum samples obtained from 1400 HCWs in two teaching hospitals during 2012. The samples were screened by ELISA for the presence of anti-HCV antibodies.
Results: In none of the participants the HCV antibody was detected. Needle stick injury was significantly higher among nurses. Younger HCWs with a shorter professional life had more frequent needle stick injury ($p<0.001$).
Conclusion: The seroprevalence of HCV in HCWs was considerably lower than that reported in the general population, and needs to be evaluated on a larger scale.

Keywords: HCV; Health Care Workers; Seroprevalence; Iran

1. Introduction

Health care workers (HCWs) are exposed to blood borne pathogens, especially Hepatitis C (HCV), hepatitis B (HBV) and HIV, through needle stick and other injuries (1). Three percent of HCV infection in HCWs is due to occupational exposures (2).

The average seroprevalence of hepatitis C antibodies in Asia is less than 2.5% in healthy adults (3). In two population-based studies in Iran, authors revealed that the overall prevalence of anti-HCV was 0.5% (4-5). Merat et al. showed that the seroprevalence of HCV has increased in Iran from 0.25% in 1994 to 0.5% in 2008(4).

The prevalence of HCV infection in specific populations of Iranians is as high as 11-25% in patients undergoing hemodialysis (6, 7), 11-80% in intravenous drug users (8,9), and 10.6% in thalassemic patients (10).

On the other hand, the prevalence of antibodies against hepatitis C in HCWs variously differes from 0.28% in Scotland (11), 3.8% in Italy (12), 4% in India (13), and 5.6% in Pakistan (14). In Iran, the prevalence of HCV infection due to exposure to blood and body fluids is yet unknown. The recent study evaluated the prevalence of HCV infection in HCWs and its relationship to the history of blood exposure.

2. Objectives

The aim of this study was to determine the seroprevalence of HCV infection among health care workers in two teaching hospitals affiliated to Iran University of Medical Sciences.

3. Materials and Methods

The recent descriptive cross-sectional study has been conducted among HCWs in two teaching hospitals (Rasoul-e-Akram and Firoozgar hospitals) of Iran University of Medical Sciences, Tehran, Iran, during a one-year period since January 2012.

Health Care Workers in different job categories including physicians, nurses, midwives, laboratory technicians, house-keeping staffs, and administrative workers who had the potential for high risk exposures, during the year preceding the study, were included. Exposure was defined as a percutaneous injury or direct contact of mucous membranes with blood and other fluids that are considered to be potentially infectious.

A standardized form was filled by a physician in order to collect data including age, gender, work experience in health care systems, and occupational injuries including history of exposure.

We didn't classify HCWs according to job department. A venous blood sample was obtained from eachindividual, being stored at -20ºC. The samples were screened by ELISA (Innotest HCV Ab III, Innogenetics N.V., Belgium) for the presence of anti-HCV antibodies in a private virology laboratory in Tehran.

Statistical analysis was performed using SPSS ver.19 software. Descriptive statistical methods were used for data analysis. Values were expressed as the mean±SD. Comparing categorical variables were considered using χ^2 test. Logistic regression test was also used for multivariate analysis using a stepwise method, and adjusted odds-ratios (OR) were reported. Differences with P values less than 0.05 were considered statistically significant.

The local ethical committee has approved the study protocol.

4. Results

One thousand and four hundred HCWs were enrolled in our study. The participants consisted of 574 males (41%) and 826 females (59%). The mean age of the participants was 33.3±5.8 years (Range 24-48 years).

The characteristics of the study subjects are shown in Table1. In all HCWs the results of anti-HCV antibodies were negative. According to the HCV prevalence among HCWs, no risk factors were assessed.

Three hundred and sixty-eight cases (26.3%) had at least one exposure during the preceding year. There was no significant difference between the prevalence of exposure among male and female groups (p=0.52). Nurses had the highest rate of exposure (43.2%), and there was significant difference between nursing and other job categories (p<0.001). Significant relationship was found between job experience, age, and the rate of occupational exposure (p<0.001).

Multivariate analysis revealed significant differences between age, job category, and job experience and exposure (Table 2).

5. Discussion

Although hepatitis C virus (HCV) infection is considered as a health problem in high risk groups such as patients undergoing hemodialysis, intravenous drug users, its prevalence in HCWs is still negotiable.

HCWs are considered as a high risk group for blood borne infections (15) but according to the various range of endemicity of HCV infection, the prevalence of HCV among HCWs are different. In countries with low endemicity such as Iran, Turkey, and England, infection risk seems to be extremely low for HCWs (16-18). Lodi et al. reported that dental health care workers in England had a slightly increased risk of HCV infection compared to general population (18).

Higher risk of exposure to blood-borne viruses has been reported in developing countries (19), the rate of exposure was different in several studies from 69% among HCWs in South Africa (20), 43.4% in Iran (21), and 31.4% in Germany (1). In this study, 368 cases (26.3%) were exposed to blood or other infectious body fluids at least once in the preceding year.

The results of our study showed that none of the included HCWs were infected by HCV using ELISA method. Considering the HCV infection prevalence in Iran, the results were predictable, and our finding was consistent with similar studies (16, 21, 22).

In our research, similar to the findings by others, the highest rate of exposure was found among nurses (23-25). On the other hand, HCWs with a shorter professional life had more frequent exposure to blood and other body fluids. Some researchers attributed this to work overload, insufficient training, lack of experience, and refusal to use protective equipments (22, 23, 26, 27). More serious educational programs and policy may help to reduce the rate of exposure in this specific group of patients.

Male and female groups were not significantly different considering the exposure rate. Bowman et al. showed that most needle stick injuries occurred among male HCWs younger than 30 years old (28), while another study reported that female HCWs experienced more frequent injuries in comparison with their male colleagues (29).

6. Conclusion

In conclusion, hepatitis C infection was uncommon in the sample group of Iranian HCWs. They do not seem to be at higher risk than other individuals. Applying educational programs for standard precautions in order to reduce occupational exposures risks in our hospitals may explain the lower rate of exposure. Despite all these, it should also be considered that a group of HCWs had never or rarely reported their needle stick injuries.

The limitation of our study was that the exposure was to unknown cases with imprecise infection history. Performing a large scale study to determine the transmission rate of HCV in HCWs who are exposed to HCV infected patients is recommended.

Table 1. Demographic data of 1400 HCWs.

Characteristic		Total (n=1400)	Exposed (n=368)	Non-Exposed (n=1032)	P-value
Gender					0.5
	Female	826 (59%)	212 (25.7%)	614 (74.3%)	
	Male	574 (41%)	156 (27.2%)	418 (72.8%)	
Age (Year)					0.001
		33.3±5.8	32.1±4.9	33.7±6.06	
Job Category					0.001
	Physician	854 (61%)	212 (24.8%)	642 (75.2%)	
	Nurse	317 (22.6%)	137 (43.2%)	180 (56.8)	
	Laboratory Technician	162 (11.6%)	12 (7.4%)	150 (92.6%)	
	Midwife	24 (1.7%)	0	24 (100%)	
	Administrative Workers	22 (1.6%)	2 (9.1%)	20 (90.9%)	
	Housekeeper	21 (1.5%)	5 (23.8%)	16 (76.2%)	
Job Experience (Year)					0.001
		13.3±5.8	12.1±5.6	13.5±5.2	

Table 2. Logistic regression results regarding the relationship between being exposed and the variables.

Variable	Odds Ratio(OR)	0.95 CI* for OR	P.value
Gender	0.82	0.64-1.06	0.1
Age	0.96	0.94-0.98	0.003
Job experience	0.86	0.79-0.91	0.02
Job category	0.51	0.42-0.63	<0.001
Physician	1.8	1.05-2.4	<0.001
Nurse	2.16	1.31-3.18	<0.001
L. technician	0.8	0.5-1.5	0.5
Midwife	_	_	_
Administrative			
Worker	0.9	0.4-1.7	0.6
House keeper	1.6	1.06-2.6	0.03

*CI: confidence interval

Conflict of Interests
None to declare.

Acknowledgements
The authors would like to thank Dr. Leila Zahedi-Shoolami for her assistance in editing the article. This research has been supported by deputy research, Iran University of Medical Sciences (90/1047).

Authors' Contribution
Mahshid Talebi-Taher designed the study and wrote the article. Sahar Rismantab designed the study and collected the samples. Siamak Khaleghi designed the study. Hossein Keyvani performed laboratory tests. Siamak Soltani and Mitra Barati analyzed the data.

Funding/Support
None to declare.

References:
1. wicker S, Jung J, Allwinn R, Gottschalk R, Rabenau HF. Prevalence and prevention of needle-stick injuries among health care workers in a German university hospital. Int Arch Occup Environ Health 2008; 81(3): 347-54.
2. Pruss-Ustün A, Rapiti E, Hutin Y. Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers. Am J Ind Med 2005; 48(6): 482-90.
3. Kao JH, Chen DS. Transmission of hepatitis C virus in Asia: past and present perspectives. J Gastroenterol Hepatol 2000; 15Suppl: E91-6. Review.
4. Merat S, Rezvan H, Nouraie M, Jafari E, Abolghasemi H, Radmard AR, et al. Seroprevalence of hepatitis C virus: the first population-based study from Iran. Int J Infect Dis 2010; 14 Supp 3: e113-6.
5. Ansari-Moghaddam A, Ostovaneh MR, Sharifi Mood B, Sanei-Moghaddam E, Modabbernia A, Poustchi H. Seroprevalence of hepatitis B surface antigen and anti hepatitis C antibody in Zahedan city, Iran: a population-based study. Hepat Mon 2012; 12(9): e 6618.
6. Makhlough A, Jamshidi M, Mahdavi MR. Hepatitis C prevalence studied by polymerase chain reaction and serological methods in haemodialysis patients in Mazandaran, Iran. Singapore Med J 2008;49(11): 921-3.
7. Alavian SM, Adibi P, Zali MR. Hepatitis C virus in Iran: epidemiology of an emerging infection. Arch Iran Med 2005; 8(2): 84-90.
8. Imani R, Karimi A, Rouzbahani R, Rouzbahani A. Seroprevalence of HBV, HCV, and HIV infection among intravenous drug users in Shahr-e-Kord, Islamic Republic of Iran. East Mediterr Health J 2008; 14(5): 1136-41.
9. Kheirandish P, SeyedAlinaghi S, Jahani M, Shirzad H, Seyed Ahmadian M, Majidi A, et al. Prevalence and correlates of hepatitis C infection among male injection drug users in detention, Tehran, Iran. J Urban Health 2009; 86(6): 902-8.
10. Tamaddoni A, Mohammadzadeh I, Ziaei O. Seroprevalnce of HCV antibody among patients with beta-thalassemia major in Amirkola Thalassemia center, Iran. Iran J Allergy Asthma Immunol 2007; 6(1): 41.
11. Thorburn D, Dundas D, McCruden EA, Cameron SO, Goldberg DJ, Symington IS, et al. A study of hepatitis C prevalence in healthcare workers in the West of Scotland. Gut 2001;48(1): 116-20.
12. Catalani C, Biggeri A, Gottard A, Benvenuti M, Frati E, Cecchini C. Prevalence of HCV infection among health care workers in a hospital in central Italy. Eur J Epidemiol 2004; 19(1): 73-7.
13. Jindal N, Jindal M, Jilani N, Kar P. Seroprevalence of hepatitis C virus(HCV) in health care workers of a tertiary care centre in New Delhi. Indian J Med Res 2006; 123(2): 179-80.
14. Aziz S, Memon A, Tily HI, Rasheed K, Jehangir K, Quraishy MS. Prevalence of HIV, hepatitis B and C amongst health workers of Civil Hospital Karachi. J Pak Med Assoc 2006; 56(1 supp 1): S48-50.
15. Tarantola A, Abiteboul D, Rachline A. Infection risks following accidental exposure to blood or body fluids in health care workers: a review of pathogens transmitted in published cases. Am J Infect Control 2006; 34(6): 367-75.
16. Shoaei P, Lotfi N, Hassannejad R, Yaran M, Ataei B, Kassaian N, et al. Seroprevalence of Hepatitis C infection among health care workers in Isfahan, Iran. Int J Prev Med 2012; 3(Suppl 1): S146-9.
17. Kuruuzum Z, Yapar N, Avkan-Oguz V, Aslan H, Ozbek OA, Cakir N, et al. Risk of infection in health care workers following occupational exposure to a noninfectious or unknown source. Am J Infect Control 2008; 36(10): e27-31.
18. Lodi G, Porter SR, Teo CG, Scully C. Prevalence of HCV infection in health care workers of a UK dental hospital. Br Dent J 1997; 183(9): 329-32.
19. Deuffic-Burban S, Delarocque-Astagneau E, Abiteboul D, Bouvet E, Yazdanpanah Y. Blood-borne viruses in health care workers: prevention and management. J Clin Virol 2011; 52(1): 4-10.
20. .Karstaedt AS, Pantanowitz L. Occupational exposure of interns to blood in an area of high HIV seroprevalence. S Afr Med J 2001; 91(1): 57-61.
21. Nail A, Eltiganni S, Imam A. Seroprevalence of hepatitis B and C among health care workers in Omdurman, Sudan. Sudan JMS 2008; 3(3): 201-3.
22. Santos-López G, Sosa-Jurado F, Vallejo-Ruiz V, Meléndez-Mena D, Reyes-Leyva J. Prevalence of hepatitis C virus in the Mexican population: a systematic review. J Infect 2008; 56(4): 281-90.
23. Hadadi A, Afhami S, Karbakhsh M, Esmailpour N. Occcupational exposure to body fluids among healthcare workers: a report from Iran. Sigapore Med J 2008; 49(6): 492- 6.
24. Blazquez RM, Moreno S, Menasalvas A, Guerrero C, Novoa A, Segovia M. Occupational exposures to blood-borne pathogens in health care workers. Enferm Infect Microbiol Clin 2001; 19(4): 156-60.
25. Tarantola A, Golliot F, Astagneau P, Fleury L, Brücker G, Bouvet E; CCLIN Paris-Nord Blood and Body Fluids(BBF) Exposure surveillance Taskforce. Occupational blood and body fluids exposures in health care workers: four-year surveillance from the Northern France network. Am J Infect Control 2003; 31(6): 357-63.
26. Azap A, Ergönül O, Memikoğlu KO, Yeşilkaya A, Altunsoy A, Bozkurt GY, et al. Occupational exposure to blood and body fluids among health care workers in Ankara, Turkey. Am J Infect Control 2005; 33(1): 48-52.
27. Abu-Gad HA, Al-Turki KA. Some epidemiological aspects of needle stick injuries among the hospital health care workers: Eastern Province, Saudi Arabia. Eur J Epidemiol 2001; 17(5):401-7.
28. Bowman W, Bohnker BK. Needle-stick epidemiology in Navy health care workers based on INJTRAK reports (2001-2002). Mil Med 2005;170(12): 1034-6.
29. Falagas ME, Karydis I, Kostogiannou I. Percutaneous exposure incidents of the health care personnel in a newly founded tertiary hospital: a prospective study. PLoS One 2007;2(2): e194.

How to cite this article: Talebi-Taher M, Rismantab S, Khaleghi S, Keyvani H, Barati M, Soltani S. Seroprevalence of HCV Infection among Health Care Workers in Two Teaching Hospitals, Tehran, Iran. Infection, Epidemiology and Medicine. 2016; 2(3): 28-30.