

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

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**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. Background

Health care workers (HCWs) are subject 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 varies 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 each individual, being stored at  $-20^{\circ}\text{C}$ . 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  $\pm$  SD. Comparing categorical variables were considered using  $\chi^2$  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  $33.3 \pm 5.8$  years (Range 24-48 years).

The characteristics of the study subjects are shown in Table 1. 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. No major difference between the prevalence of exposure amongst male and female groups ( $p=0.52$ ) were found. Nurses had the highest level of exposure (43.2%), and there was noteworthy difference between nursing and other job categories ( $p<0.001$ ). Significant relationship was found between job experience, age, and the percentage of job-related 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 previous 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
<b>Gender</b>				0.5
Female	826 (59%)	212 (25.7%)	614 (74.3%)	
Male	574 (41%)	156 (27.2%)	418 (72.8%)	
<b>Age (Year)</b>	33.3±5.8	32.1±4.9	33.7±6.06	0.001
<b>Job Category</b>				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%)	
<b>Job Experience (Year)</b>	13.3±5.8	12.1±5.6	13.5±5.2	0.001

**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
<b>Gender</b>	0.82	0.64-1.06	0.1
<b>Age</b>	0.96	0.94-0.98	0.003
<b>Job experience</b>	0.86	0.79-0.91	0.02
<b>Job category</b>	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.

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**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.

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