

## Unsafe Practices Associated with HCV Infection Among Adults: A Case Control Study

### Abstract

**Background:** Infection with the hepatitis C virus (HCV) occurs globally. It is a substantial cause of chronic liver disease, cirrhosis and hepatocellular carcinoma. Egypt one the countries that has the highest hepatitis C burden in the world. The occurrence of HCV is directly related to the number of individuals who regularly share injection instruments and to the prevalence of inappropriate parenteral procedures in healthcare facilities. The study aimed to identify unhealthy community practices related to HCV infection. **Methods:** a nested case control study carried out in Damietta Governorate, Egypt. Where 150 cases (positive for HCV) and 300 controls (negative for HCV) were randomly chosen. **Results:** Participant who shared shaving razor was 8.4 times more likely to acquire HCV infection followed by IV fluid and needle or sharp stick (about six times more risk). While acupuncture, cupping, tattooing and traditional cauterization carried 1.6 to 3.6 times more risk for HCV infection. **Conclusions:** Unhealthy community practices carried a higher risk for acquiring HCV infection. It is highly advocated to strengthen infection prevention and control program in health care facilities and health education programs to enhance community awareness and empowerment.

**Keywords:** HCV, Infection, practices, risk factors, unsafe

### Introduction

Chronic hepatitis C virus (HCV) infection is a global health concern. It is a liver infection caused by the HCV which is a blood-borne disease.<sup>[1,2]</sup> World Health Organization (WHO)<sup>[3]</sup> documented that 1.75 million new HCV infections occurred worldwide in 2015, with the highest percentage in the European Region and the Eastern Mediterranean Region.

About 55–85% of individuals infected with the HCV develop chronic infection. Within 20–30 years approximately 5–20% of those chronically infected will develop cirrhosis, and 1–5% die from consequences of chronic infection (cirrhosis and hepatocellular carcinoma).<sup>[4]</sup>

Globally, viral hepatitis is the seventh leading cause of mortality and HCV is responsible for a third of this mortality. HCV accounts for 60% of viral hepatitis mortality and disability-adjusted life years in the Middle East and North Africa.<sup>[5,6]</sup>

WHO<sup>[3]</sup> registered that approximately 71 million people were living with chronic

HCV infection in the world, accounting for 1% of the populations. The prevalence of HCV infection is more heterogeneously allocated, with a variation across and within WHO regions and countries. Its dissemination through breaches in infection control measures or injection drug use may clarify this pattern. The highest level was in the Eastern Mediterranean Region (2.3%) followed by the European Region (1.5%).

Central Asia and Africa are considered to have a high prevalence (>3.5%), whereas Southern Africa, North America, Andean and Central Latin America, Pacific Asia, and Western and Central Europe estimated to have low prevalence (<1.5%).<sup>[7]</sup> Globally, 80% of all HCV infections located in 31 countries, with six countries (China, Pakistan, Nigeria, Egypt, India, and Russia) representing >50% of all infections.<sup>[8]</sup>

The prevalence of HCV is about 10–15% among Egyptian, which is rated as the highest in the world and genotype 4 represents 92% of Egyptian HCV infections.<sup>[9–11]</sup> A cross-sectional survey among adults involved 21 governorates in Egypt reported that overall HCV prevalence was 15.0%.<sup>[12]</sup> High HCV prevalence among

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Egyptian was explained by previous massive schistosoma treatment intramuscular injection using non-disposable syringe during the previous second half of the twentieth century.<sup>[13]</sup> Evidence of ongoing transmission was reported that might be due to infection control or behavioral issues.<sup>[14]</sup>

HCV is transmitted through contact with contaminated blood and other body fluids, unsafe drug injections or non-sterile surgical procedures. Also, non-medical procedures (e.g., tattooing or piercing) when the skin is injured, sharing of personal items such as shaving razors and toothbrushes, and accidental needle-prick exposures among healthcare providers and, where blood safety measures are insufficient, via transfusion of unscreened blood and blood products.<sup>[15]</sup>

World Health Organization (Hepatitis C in the WHO European Region Fact sheet, 2019) revealed that Hepatitis C is curable and the new antiviral medicines can cure more than 95% of people, reducing the risk of complications and death but access to diagnosis and treatment is low. There is no vaccine for hepatitis C. Prevention should, therefore, be focused on reducing the risk of exposure to the virus.

The aim of this study was to identify risk factors especially the unsafe community practices associated with HCV infection among adults.

## Methods

### Study design

A nested case-control study followed household survey in Damietta, Egypt, by multistage random sampling: three among five districts were chosen randomly. Then one village or city (as a cluster) was chosen from each district. The sample included three villages and three cities representing all districts. One in every three houses was chosen. All residents aged 20 or older years accepted to share in the survey were included. The sample size was determined using Epi info, version 7.1.5, 2015. Randomly 150 patients (services as cases group) were selected from those who showing positive HCV and 300 participants (services as controls group) were chosen from those who showing negative HCV.

### Ethical approval

All procedures performed in this study were in accordance with the ethical standards of the Damietta Faculty of Medicine, Al-Azhar University, and National Research Committee and meet the ethical standard outlines in the Helsinki Declaration of 1975 as revised in 2000.

### Data collection

A predesigned questionnaire was used to collect sociodemographic data (age, sex, residence, marital status, education, and occupation); risk factors (the history of previous exposure to surgical intervention, dental

procedures, stitches, injecting drugs, blood transfusion, bilharzial injection treatment, needle prick, endoscopic examination, or renal dialysis); and unsafe community practices such as sharing shaving razors, traditional cauterization, acupuncture, cupping (Hijama) and tattooing.

### Viral serology

Venous sampling (5 ml) was collected and allowed to clot. Serum was separated and kept frozen at  $-20^{\circ}\text{C}$  until assay. ELISA kits (Fortress Diagnostic Ltd) were used to estimate anti-HCV.

### Statistical analysis

For data entry and analysis; SPSS software program, version 16.0 was used. Univariate analysis was used to compare variables for the outcomes of interest. A students t-test was used to compare means while,  $\chi^2$  test was used to compare categorical variables. A multiple logistic regressions analysis with enter method was carried to clarify the independent risk factors. A P-value  $< 0.05$  was classified as statistically significant with a 95% confidence interval.

## Results

A total of 450 patients aged 20–67 years were included in this study, 150 as cases (positive for HCV) and 300 patients as controls (negative for HCV). Regarding sociodemographic characteristics of the study groups, Table 1 reveals a highly significant association between HCV infection and participants age, residence, level of education, and marital status ( $P = 0.001$ ).

Regarding medical practices Table 2 shows that, persons who have a history of dental procedure, past history of stitches or any surgical operation were at 2 times more risk for HCV compared to persons who have not. Also history of injection with intramuscular bilharzial treatment, blood transfusion and intravenous fluid intake carried significantly higher risk for HCV infection ( $P < 0.001$ ). Also, unsafe community practices (cupping, acupuncture, shared shaving razor, traditional cauterization, needle or sharp stick, and tattooing) were significantly different between HCV-infected patients and controls ( $P < 0.01$ ).

Table 3 shows the multivariable analysis, two socioeconomic factors (marital status and residence) were associated with higher odds of having HCV (OR = 2.7, CI = 1.5–5.0; OR = 3.6, CI = 1.9–6.5, respectively). Regarding healthcare practices, patients with history of stitches or minor surgeries, intravenous fluid, dental procedure, and renal dialysis were more likely to have HCV infection (OR = 5.2, CI = 2.5–10.8; OR = 3.7, CI = 1.8–7.4; OR = 1.9, CI = 1.1–3.4; OR = 2.6, CI = 1.1–6.5, respectively), compared with those without this history. Also, four unsafe practices in the community (razor sharing, acupuncture, needle or sharp stick, and cupping) were more likely to cause

**Table 1: Comparison of sociodemographic characteristics between cases and controls**

Risk factors	Case		Control		Odds ratio (OR)	P
	n=150	%	n=300	%		
Age	44.9±9.8		40.8±10.7			0.001
20-49 years	67	45.0	179	60.0	1.2	0.03
>50 years	83	55.0	121	40.0		
Gender						
Male	72	48.0	168	56.0	0.7	0.1
Female	78	52	132	44		
Level of education						
below Secondary education	112	74.7	166	55.3	2.4	0.001
Secondary education and higher	38	25.3	134	44.7		
Residence						
Rural	103	68.7	122	40.7	2.1	0.001
Urban	47	31.3	178	59.3		
Marital status						
Ever married	107	71.3	111	37.0	2.8	0.001
Never married	43	28.7	189	63.0		
Occupation						
Non-worker or employee	83	55.3	138	46.0	1.5	0.06
Worker or employee	67	44.7	162	54.0		

**Table 2: Comparison of risk factors between cases and controls**

Risk factors	Case		Control		Odds ratio (OR)	P
	n=150	%	n=300	%		
Dental procedure	96	64.0	134	44.7	2.2	0.001
Previous stitches	86	57.3	129	43.0	18	0.004
Major surgical operation	73	48.7	83	27.7	2.5	0.001
Schistosomiasis injection treatment	60	40.0	90	30.0	1.6	0.03
Renal dialysis	18	12.0	27	9.0	1.4	0.3
IV drugs	70	47.3	160	53.3	0.8	0.2
Blood transfusion	23	15	27	9.0	1.8	0.04
IV fluid	122	81	127	42	5.9	0.001
Endoscopic examination	42	28	80	27	1.1	0.8
Cupping	106	71	121	40	3.6	0.001
Acupuncture	93	62	89	30	3.9	0.001
Shared shaving razor	126	84	115	38	8.4	0.001
Traditional cauterization	88	59	139	46	1.6	0.01
Needle or sharp stick	110	73	97	32	5.8	0.001
Tattooing	87	58	89	30	3.3	0.001

**Table 3: Multivariable analysis, factors independently associated with hepatitis C infection**

	B	P	Adjusted OR	95% CI
Stitches or minor surgeries	1.7	0.001	5.2	2.5-10.8
Razor sharing	1.6	0.001	4.8	2.0-11.5
IV fluid	1.3	0.001	3.7	1.8-7.4
Residence	1.3	0.001	3.6	1.9-6.5
Acupuncture	1.2	0.001	3.4	1.6-7.1
Needle or sharp stick	1.2	0.003	3.2	1.5-6.8
Marital status	1.0	0.001	2.7	1.5-5.0
Renal dialysis	0.95	0.04	2.6	1.1-6.5
Cupping	0.8	0.02	2.3	1.1-4.5
Dental procedure	0.7	0.04	1.9	1.1-3.4

HCV infection (OR = 4.8, CI = 2.0–11.5; OR = 3.4, CI = 1.6–7.1; OR = 3.2, CI = 1.5–6.8; OR = 2.3, CI = 1.1–4.5, respectively).

### Discussion

Globally, HCV infection is an important cause of chronic liver cirrhosis, hepatocellular cancer. HCV seroprevalence is at up to 40% in some regions of Egypt.<sup>[16]</sup> Prevalence of HCV infection is specifically linked to the number of people who frequently sharing injection instruments and to the prevalence of unsterile parenteral procedures in healthcare facilities.<sup>[4]</sup>

Regarding sociodemographic factors, age, and education level was significant risk factors for HCV infection that is similar to the results of Iranian study<sup>[17]</sup> that reported association between age and HCV infection. Education provides information about the diseases, mode of transmission and how to prevent it. Persons living in rural area were at higher risk for HCV. This agreement with another study was done in Yemen<sup>[18]</sup>, which showed a relation between residence and HCV. This may be clarified by low income and unsterilized equipment that used in rural medical. HCV infection was significantly associated with the marital status but was not gender. This in line with other study.<sup>[19]</sup>

Regarding unsafe invasive procedures, we observed that history dental procedure was a risk for HCV. This supported by others.<sup>[20,21]</sup> Al-Kubaisy *et al.*<sup>[22]</sup> reported that dental extraction considered as an important risk factor for acquiring HCV.

Also, history of stitches, minor or major surgical operation, history of intramuscular bilahrzjal treatment, blood transfusion and intravenous fluid intake were statistically significant risk factors of HCV infections. Abo-Amer *et al.* reported a similar finding.<sup>[23]</sup>

As regards to unhealthy practices in the community, HCV infection was significantly associated with unsafe practices in the community such as cupping, acupuncture, traditional cauterization, needle or sharp stick and tattooing and sharing shaving razors at community barbers.

Abd El-Wahab *et al.*<sup>[24]</sup> reported an association between HCV infection and Hijama performed among the younger age group by the informal practitioner, tattooing, sharing shaving instruments, and sharp objects, and the use of community barber or manicure sets. Mohd Suan *et al.*<sup>[25]</sup> showed that cupping was a risk factor for HCV.

Saliva contains abundant of HCV and on toothbrushes of hepatitis C patients, sharing this item by their household individual carries a risk of HCV infection.<sup>[26]</sup> Persons with a history of one or more tattoos were more in HCV patient cases than controls.<sup>[27,28]</sup> A study in Iran<sup>[29]</sup> showed that sharing personal razors associated with two times more risk of HCV infection.

### Limitations

First, the study used a case-control design and data on the exposure were collected retrospectively, so recall bias is unavoidable. Second, the sample was not representative of all the Egyptian population as it was conducted in one governorate only.

### Conclusions

The results of this study showed that exposure to unsafe medical procedures and social practices were risk factors for HCV infection in Egypt.

### Recommendations

Due to limited resources, activities to prevent the transmission HCV should focus on:

- Safe practices in the healthcare setting through expansion and promotion of infection control program.
- Health education campaigns, to increase the awareness of the community about the dangers of unsafe medical practices and empowering them to refuse unsafe medical practices.

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### Conflicts of interest

There are no conflicts of interest.

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