Seroprevalence of HCV Among Cairo University Students in Egypt

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Hepatitis C virus (HCV) is highly prevalent in Egypt. This work aimed at determining the seroprevalence of HCV among Cairo University students. The present study included 3,000 students from Cairo University, Egypt. Blood sample was obtained from each participant to be tested for HCV seromarker. HCV RNA detection by polymerase chain reaction (PCR) was carried out for those with positive anti-HCV. Overall prevalence rate of HCV antibody (anti-HCV) was 4.6%. It showed that the prevalence was relatively higher among females (86/1660; 5.2%) while males (51/1340; 3.8%) with no significant difference. PCR for HCV RNA was detected in 31.4% of the HCV antibody positive subjects (43/137). Which showed statistical significant difference between males (29/51) and females (14/86) at $P = 0.001$. Despite the prevalence rate reported in the present study was similar to anti-HCV prevalence among persons in the same age group, confirmed that HCV infection is detected among Cairo University students. *J. Med. Virol. 88:1384–1387, 2016*.
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KEY WORDS: HCV (hepatitis C virus); anti-HCV; prevalence; PCR (polymerase chain reaction)

INTRODUCTION

The highest prevalence of HCV infection is reported in Egypt (14.7%) [Cuadros et al., 2014], which is a major reason for chronic liver disease, cirrhosis of the liver, hepatocellular carcinoma (HCC), and liver transplant within the nation [EMOH, 2007].

Aim of the Work

To determine the seroprevalence of hepatitis C virus among Cairo University students.

Sub-Objective

To assess the potential risk factors.

PATIENTS AND METHODS

Study Subjects

This study included 3,000 undergraduate students undergoing medical examination at the Cairo University Hospital, Egypt, during September 2013, included 1,660 females and 1,340 males. Their mean age of 18.1 ± 0.7 who were offered testing for hepatitis C seromarker.

All subjects gave an informed consent, and the study applied the ethics of Declaration of Helsinki.

Methods

Assay for HCV antibodies using rapid anti-HCV test kit. The diagnosis of HCV infection by the presence of the virus antibodies using EIA method is usually followed by Western Blot for confirmation. Rapid anti-HCV test, with its advanced quality, detects virus antibodies in human plasma or serum. This test is based on immune-chromatography giving the result in 15 min.

Procedure principle. The first step is to have a blood sample and the provided diluent is added immediately. The conjugate of HCV/antibody complex will be formed when HCV antigen in colloidal gold conjugate established in the sample pad reacts with HCV antibody in the blood sample. While allowing the conjugate to spread along the test strip reaching the colored test band. The absence of test line indicates a negative sample. A colored control band appears at the end of the test in the control region whatever the test result, which indicates the validity

of the test. The antigens applied in this test are recombinant proteins identical to strongly HCV immune reactive regions. The overall specificity was found to be 97–99%.

All samples were fresh and used immediately in this test.

HCV RNA Quantitative by TaqMan Real Time PCR

Positive testes were confirmed with PCR for HCV RNA, as all positive subjects were willing to provide blood samples for HCV PCR testing.

The Cobas Ampliprep/Cobas TaqMan (CAP/CTM) is fully automated real time PCR.

Interpretation of viremia:

Moderate: 200,000–2,000,000 (IU/ml);
High: >2,000,000 (IU/ml);
Low: <200,000 (IU/ml).

Statistical Analysis

Patients' data were statistically analyzed using SPSS. For quantitative variables, data were expressed by mean and standard deviation and compared using unpaired t-test. For qualitative variables, data were expressed by frequency and percentage. Chi-square test or Fischer's exact test for comparing between groups. P values <0.05 and <0.01 were considered statistically significant and highly significant respectively.

RESULTS

A total of 3,000 students from Cairo University, Egypt participated in the present study to estimate the HCV seroprevalence among them.

The participants included 1,660 (55.3%) females and 1,340 (44.7%) males. The mean age was 18.1 ± 0.7, (96.2%) of them came from lower Egypt, whereas (3.8%) came from upper Egypt (Table I).

The seroprevalence of anti-HCV among the 3,000 studied subjects showed that 137 (4.6%) were positive for anti-HCV (Table II).

TABLE I. Sociodemographic Features of the 3,000 Studied Subjects

Category	Students (n = 3,000), N (%)
Gender	
Female	1,660 (55.3)
Male	1,340 (44.7)
Age	
Mean	18.1 ± 0.8
Location (place of origin)	
Lower Egypt	2,887 (96.2)
Upper Egypt	113 (3.8)
Family history of HCV	
+ve	150 (5.0)
−ve	2,850 (95)

TABLE II. Seroprevalence of Anti-HCV Among the 3,000 Studied Subjects

Studied subjects	Number positive (%)	Number negative (%)
Students (3,000)	137 (4.6)	2,863 (95.4)

The frequency of anti-HCV in relation to sex showed 86 females out of total 1,660 (5.2%) and 51 males of total 1,340 (3.8%) which did not show a statistical significance ($P = 0.7$) (Table III).

It was found that surgical exposure and dental care were the predominant risk factors for HCV infection as it was reported in 32.1% and 35.8 % of the subjects with anti-HCV positive (Table IV).

The distribution of anti-HCV in relation to place of origin and sex showed a highly significant difference in anti-HCV prevalence between the two regions (higher in upper Egypt), and significant difference between males and females in upper Egypt, these differences result from the strikingly high prevalence (18.3%) among upper Egypt females. The difference between prevalence in males versus females in lower Egypt was not significant (Table V).

Table VI data showed that in lower Egypt prevalence of HCV RNA for males was significantly higher than HCV RNA prevalence for females ($P = 0.001$), while in upper Egypt prevalence of HCV RNA did not show significant difference between males and females.

DISCUSSION

The Egyptian Demographic and Health Survey (EDHS), 2008 was conducted on a large population sample to estimate the prevalence of HCV among the age group 15–59 years, which was reported to be 14.7% [El-Zanaty and Way, 2008]. Therefore, the highest prevalence of HCV was reported in Egypt [Lavanchy, 2011].

It has been suggested that the comprehensive transmission during mass treatment campaigns using parenteral-antischistosomal-therapy (PAT) is the underlying cause for the high prevalence of HCV infection in Egypt [Frank et al., 2000; Strickland, 2006]. For the time being, hepatitis C infection and its sequels are through the main challenges of people health in Egypt [Miller and Abu-Raddad, 2010].

TABLE III. Frequency of Anti-HCV in Relation to Sex

	Anti-HCV		
Gender	Negative (n = 2,863), N (%)	Positive (n = 137), N (%)	P-value
Female	1,574 (94.8)	86 (5.2)	0.7
Male	1,289 (96.2)	51 (3.8)	

TABLE IV. Anti-HCV as Related to Contact With Risk Factors

| | Anti-HCV | | | |
	Negative, N (%)	Positive, N (%)	Total, N (%)	P-value
Blood transfusion				
Yes	99 (3.5)	4 (1.5)	103 (3.4)	0.7
No	2,764 (96.5)	133 (98.5)	2,897 (96.6)	
Total	2,863 (95.4)	137 (4.6)	3,000 (100.0)	
Dental care				
Yes	824 (28.8)	49 (35.8)	873 (29.1)	0.08
No	2,039 (71.2)	88 (64.2)	2,127 (70.9)	
Total	2,863 (95.4)	66 (1.1)	3,000 (100.0)	
Surgical operation				
Yes	649 (22.7)	44 (32.1)	693 (23.7)	0.01
No	2,214 (77.3)	93 (67.9)	2,307 (76.4)	
Total	2,863 (95.4)	137 (4.6)	3,000 (100.0)	

TABLE V. Distribution of Anti-HCV in Relation to Place of Origin and Sex

| | Lower Egypt | | Upper Egypt | | |
	Male (1,309), N (%)	Female (1,578), N (%)	Male (31), N (%)	Female (82), N (%)	P-value
Anti-HCV					
Positive	50 (3.8)	71 (4.5)	1 (3.2)	15 (18.3)	0.001
Negative	1,259 (96.2)	1,507 (95.5)	30 (96.8)	67 (81.7)	
P-value		0.3		0.04	

The aim of the present study was to determine the seroprevalence of HCV among Cairo University students in Egypt.

A total of 3,000 students (1,340) males and (1,660) females with a mean age of 18.1 ± 0.7 from Cairo University, Egypt were studied.

All participants were subjected to history taking, probable routes of infection were assessed and detection of HCV antibody.

In this study, of the 3,000 participants, 137 (4.6%) were anti-HCV positive. This prevalence among college students was similar to the anti-HCV prevalence in persons in the same age group reported in Egyptian Demographic and Health Survey (EDHS) 2008, it estimated the HCV prevalence among similar age groups was 4.1% (males = 5.6% and female = 2.7%) among youth aged 15–19 years, and was 4.9% (males = 4.3% and female = 5.4%) among youth aged 20–24 years.

Also this could be explained by application of universal precaution for prevention of HCV transmission in general community, increased awareness of HCV and its routes of transmission, and the higher education level of the studied subjects.

In the present study, females were found to have higher HCV prevalence (86/1660; 5.2%) in relation to males (51/1340; 3.8%) which did not show a statistical significant difference; this contrast the finding of Nafeh et al. [2000] who reported the HCV prevalence was higher in males compared to females (11.3% versus 6.5%).

Regarding HCV-RNA prevalence among the studied anti-HCV positive subjects was found to be 31.4%

TABLE VI. Distribution of HCV RNA +ve by PCR in Relation to Region and Sex

| | Sex | | |
	Male, N (%)	Female, N (%)	P-value
Lower Egypt			
PCR +ve	29 (2.2)	12 (0.8)	0.001
Total − PCR +ve	1,280 (97.8)	1,566 (99.2)	
Total	1,309 (100.0)	1,578 (100.0)	
Upper Egypt			
PCR +ve	0 (0)	2 (2.4)	0.3
Total − PCR +ve	31 (100)	80 (97.6)	
Total	31 (100.0)	82 (100.0)	

(43 out of 137). Which showed statistical significant differences between males (29/51) and females (14/86) at $P = 0.001$. This prevalence is higher than that found in the group of same age in EDHS, 2008 as (females $= 1.9\%$ and males $= 3.7\%$) were found to have active infection in age 15–19, and (females $= 2.9\%$ and males $= 3.2\%$) in age 20–24 years and similarly men were likely to be actively infected more than women.

This was lower than that recorded by Nafeh et al. [2000] who detected HCV RNA in 62.8% of the anti-HCV positive subjects.

Mohamed et al. [2005] reported that although wound sutures, surgery, injections, and intravenous infusions all increased the propability of HCV infection, however, did not show statistical significance. Edris et al. [2014] reported in Damietta Governorate, Egypt, surgery, stitches, dental procedures, contact with infected person, and schistosomiasis treatment were the leading risk factors for HCV infection.

A previous study in Egypt, a country with high HCV load, reported that children with diabetes were more exposed to daily medical practice including insulin injections and blood glucose observation. HCV prevalence among diabetic children less than 9 years was comparable to non-diabetic children in the same age group (2.5% vs. 1.4%) [El-Karaksy et al., 2010].

Regarding our subjects, the commonest exposures were surgical operations and dental procedures. Blood transfusion, family history of HCV, and chronic illness were less common.

Regarding our anti-HCV positive subjects, the most common exposures were surgical operations (44/137; 32.1%) and dental procedures (49/137; 35.8%). There was no significant difference except for surgical exposure ($P = 0.01$).

In this study group, 873 out of 3,000 (29.1%) gave a history of dental procedures, 49 of them were positive for HCV antibody; this contrast the finding of Medhat et al. [2002] and Enomoto et al. [2001] who suggested that dental treatment is a prevalent possible risk factor for HCV infection similar to frequent injections.

In this study, 150 out of 3,000 subjects with positive family history of HCV (5%), none of them were positive for HCV antibody. Strickland [2006] re-] reported that children are particularly at high risk if their parents with HCV infection.

Nafeh et al. [2000] mentioned that the HCV prevalence was higher in lower Egypt. We found in this study, of the 2,887 paticipants came from Lower Egypt, 121 were anti-HCV positive, and only of the 113 participants came from Upper Egypt, 16 of them were anti-HCV positive.

CONCLUSIONS

Despite the prevalence rate reported in the present study was similar to anti-HCV prevalence among persons in the same age group, confirmed that HCV infection is detected among Cairo University students.

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