The Prevalence of Hepatitis C Infection among Kafr El-Sheikh University Students after Egypt's Successful National Eradication Campaign

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Background and study aim: Egypt had the highest worldwide prevalence of the hepatitis C virus during the last few years. The aim of our research was to determine the seroprevalence of hepatitis C virus among college students at Kafr El-Sheikh University after mass treatment of Egyptian population.

Patients and Methods: Six thousand students were enrolled in this research. The data were taken, including exposure to risk factors of hepatitis C infection, family history of hepatitis C, and the history of previous treatment of hepatitis C. All students were tested for hepatitis C virus antibody. HCV-RNA by polymerase chain reaction was performed for students with detectable hepatitis C virus antibody.

Results: The mean age of the studied group was 19.41 ± 1.23 years. In total, 4356 (72.6%) were females and 1644 (27.4%) were males. Two students (0.03%) had positive hepatitis C virus antibody with undetectable HCV RNA. They were two females aged 18 and 21 years old. Both had a history of dental procedures and a family history of hepatitis C infection. However, one of them was previously treated for hepatitis C with direct-acting antiviral drugs.

Conclusion: There was low prevalence of hepatitis C virus infection among the new students in Kafr Elsheikh University, and this might be a result of generalized decline of hepatitis C virus infection prevalence in Egypt due to successful control.

INTRODUCTION

Hepatitis C virus (HCV) infection poses a significant health issue worldwide. About 20–30% of infected people will develop cirrhosis within 10–20 years of infection, and 2–7% of these patients will develop hepatocellular carcinoma if proper antiviral treatment is not received [1].

HCV infection can spread through exposure to infected blood. Infected blood transfusions, blood products, using infected syringes, needle-stick injuries in medical facilities, and organ transplantations can cause HCV spread. Inadequately sterilized equipment, including social, cultural, and behavioral practices that involve percutaneous procedures (e.g., circumcision, ear and body piercings), can also lead to HCV transmission [2].

There is currently no effective HCV vaccination [3]. Therefore, screening for HCV in asymptomatic patients is a crucial first step in enhancing the identification and, eventually, treatment of infected people [4].

For previous decades, Egypt had one of the highest rates of HCV infection worldwide. In 2008, the completion of the Health Survey (EDHS) found that 9.8% and 14.7% of people had detectable HCV RNA and HCV antibodies, respectively [5].

Furthermore, the distribution of active HCV infection in Egypt differs across various regions. Menoufia stands out with the highest rate at 8%. A survey conducted in 2015 found that other governorates, including Sharkia, Menya, Gharbia, Dakhalia, Behera, Damietta, Fayoum, and Beni-Suef, had rates exceeding 5% [6].
The Egyptian government has been working to achieve the World Health Organization's (WHO's) objective of eliminating viral hepatitis by 2030. The president of Egypt sponsored "100 million healthy lives" a nationwide initiative to eradicate HCV, which provided free hepatitis C testing and treatment, beginning in 2014 and strengthening in 2018 [7].

A comprehensive strategy was developed in 2014 by the National Committee for Control of Viral Hepatitis (NCCVH), which included educating the public about HCV transmission and prevention, nationwide mass screening campaigns, manufacturing direct-acting antivirals (DAAs) locally, and setting up specialized treatment centers across the nation with the required infrastructure and medical staff [8]. Consequently, the prevalence of HCV has decreased from 6% of the population in 2015 to below 0.5% of the entire community in 2021 (from 5 million individuals to under 400,000 individuals) [9]. Nevertheless, approximately 12.5 million adults in Egypt have not been tested [8].

The school was the site of the teen population screening. Out of the 7 million youths who participated in this screening, 20,000 (0.3%) were found to be seropositive and were thereafter examined, with a 100% SVR rate achieved [10]. In addition, the NCCVH intends to maintain HCV-related improvements by screening all first graders in preparatory school and students starting college between 2021 and 2026 [8]. This study aimed to describe the HCV seroprevalence among students from various Egyptian governorates at Kafr El-Sheikh University following mass treatment of Egyptian population.

PATIENTS AND METHODS

This cross-sectional research was carried out among students at Kafr Elsheikh University (KFU) who were enrolled for the academic year 2023–2024. Data gathering began in November 2023 and extended until January 2024. Six thousand male and female students aged 17 to 23 years were screened. They were subjected to questionnaires to determine the risk factors to which they were exposed during their lives. Written consent was obtained from all participating college students to preserve the privacy of their data. Students were screened for HCV infection as part of an infection control program.

Hepatitis C antibody tests were performed using a commercial ELISA kit (Axsym 3.0; Abbott Laboratories, Chicago, IL). To confirm the HCV diagnosis, students with positive anti-HCV enzyme-linked immunosorbent assay were retested using real-time PCR.

The questionnaire, based on Shinde et al.'s questionnaire [11], was in Arabic and composed of 8 questions, including personal and demographic data (age, gender, and place of residence (governorate)), factors that increase the likelihood of hepatitis C virus infection (prior surgical procedures, blood transfusions, prior dental treatments, and past anti-HCV therapy), along with a family (household members) background of HCV.

Statistical Analysis

The study utilized SPSS version 20 for data analysis, presenting data as mean ± standard deviation (SD), frequency and percentage.

RESULTS

Six thousand students from different Egyptian governorates were enrolled in our study. They were 4356 (72.6%) females and 1644 (27.4%) males, with a mean age of 19.41 ± 1.23 years. Only 2 students (0.03%) had positive HCV antibodies. Both had a negative HCV RNA. Demographic data and data about the history of all students are presented in (Table 1). These two cases were females aged 18 and 21years. Both had a history of dental procedures and family history of HCV infection. One of them had received anti HCV therapy with direct acting antiviral drugs (Table 2).

Table 1. Demographic data of studied subjects.

Data	**Total (n= 6000)**
Age (years)	
Mean ± SD	19.41 ± 1.23
Range	17 - 23
	No. %
Gender	
Male	1644 (17.4%)
Female	4356 (72.6%)
Governorate	
Alexandia	696 (11.6%)
Beheira	888 (14.8%)
Beni Suef	24 (0.4%)
Cairo	24 (0.4%)
Dakahlia	2640 (44%)
Damietta	624 (10.4%)
Gharbia	168 (2.8%)
Giza	60 (1%)
Kafr el-Sheikh	300 (5%)
Menofia	576 (9.6%)
Surgical procedures	360 (6%)
Blood transfusion	12 (0.2%)
Dental procedures	4188 (69.8)
Family history of HCV	552 (9.2%)
History of anti HCV treatment	1 (0.0167%)
HCV antibody positive	2 (0.03%)
Detectable HCV RNA by PCR	0

Table 2. Data of HCV antibody positive cases.

Data	Case I	Case II
Age (years)	18	21
Gender	Female	Female
Governorate	Dakahlia	Menofia
Dental procedures	Positive	Positive
Family history of HCV	Positive	Positive
History of anti HCV treatment	Positive	Negative
Detectable HCV RNA by PCR	Negative	Negative

DISCUSSION

HCV is a primary cause of liver cirrhosis and associated complications, with yearly incidence rates for liver decompensation, hepatocellular carcinoma (HCC), and transplants being 6.37%, 3.36%, and 4.58%, respectively. [12]. Prior to 2015, Egypt had the globe's highest hepatitis C burden. In 2015, its prevalence was 7% (5.5 million patients); by 2021, it was determined that it had decreased to 0.4% [12, 13]. After DAAs had been introduced, the Egyptian government started mass screening and treatment of HCV under the supervision of NCCVH to achieve the target "Egypt free of HCV." In 2030. As a result, about 1.8 million patients were treated successfully within four years between 2014 and 2018 [15].

In this study, among 6000 students, two students tested positive for HCV antibody. However, these two students had an undetectable HCV RNA by PCR. These findings are less than those of a prior study, at Kafr Elsheikh University in 2018, that involved 9049 students. According to this earlier study, 24 students had HCV RNA-positive results out of the 25 students who had positive antibodies [16].

In 2018, the research involved 48,972 students from Menoufia University in Egypt. The prevalence rate of HCV antibodies was 498 (1%). HCV-RNA PCR testing was positive in 355 out of 48,972 (0.7%), indicating a higher prevalence in females compared to males, although the difference was not statistically significant [17]. Also, our results are lower than the results reported by El Gilany & El Fedawy in 2006, who reported the HCV seropositivity among students in Mansoura University as 2.7%. Moreover, Esmat et al. found that 4.6% of the students were anti–HCV positive in a study that included 3000 undergraduate students undergoing medical examination at Cairo University Hospital, Egypt, in September 2013. Our findings were also much lower than the findings of the Egyptian demographic study performed in 2015, which reported that 4% of the Egyptian population aged 15 to 59 years had an active HCV infection. The explanation of this difference may be due to the increase in the rates of HCV infection with age, mass screening and treatment of HCV in Egypt, awareness of HCV and its mode of transmission, and higher educational levels of the studied subjects [18, 19].

Our study detected that the two HCV antibody-positive students were females. They possessed a history of dental treatments and a family background of HCV. Iatrogenic transmission was blamed as the main driver of the HCV epidemic in Egypt [20].

In this study, although we selected a sample of students of the same age group, it might give an idea about the current situation in some Egyptian governorates. Many students visited the dentist (69.8%) and had a family history of HCV infection (9.2%), for example. Furthermore, they are not only from Kafr El-Sheikh (5%). Some belong to other governorates, whether from the Nile Delta or from outside it as well.

CONCLUSION

In conclusion, the low prevalence of HCV infection among the new students at Kafr Elsheikh University reflects the marked decline in HCV prevalence among the young Egyptian generations. This decline reflects the effects of mass screening and treatment through the national campaign for control of viral hepatitis .

LIST OF ABBREVIATIONS

HCV = Hepatitis C virus.

NCCVH = National Committee for Control of Viral Hepatitis.

DAAs = Direct acting antivirals.

WHO = World Health Organization

Ethical considerations: This research was performed following the principles outlined in the Declaration of Helsinki. It was approved by the Ethical Committee in the Faculty of Medicine, Tanta University (Approval code: 36264PR372/10/23). All participants agreed to be enrolled in the research after a full explanation.

Author contribution: We declare that all listed authors have made substantial contributions to all the following three parts of the manuscript:

-Research design, or acquisition, analysis or interpretation of data.

-drafting the paper or revising it critically.

-approving the submitted version.

We also declare that no-one who qualifies for authorship has been excluded from the list of authors.

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Conflict of interest

None

HIGHLIGHTS

- Hepatitis C virus (HCV) infection is a major global health concern .
- The low prevalence of HCV infection among the new students in Kafr Elsheikh University is reflecting marked decline of HCV prevalence in Egypt .
- Egypt being free of hepatitis C is not just a dream; it is becoming a reality.

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