

"changing in the prevalence of hepatitis C virus infection in Fayoum governorate , Egypt" Hagar S Abdelrahman⁽¹⁾, Abdelrahman Abdelmoktader ⁽²⁾, *Hammad A A* ⁽³⁾ and Rasha H Bassyouni ⁽⁴⁾.

(1) Resident of Medical Microbiology and Immunology, Faculty of Medicine, Fayoum University.

(2) Lecturer of Medical Microbiology and Immunology, Faculty of Medicine, Fayoum University.

(3) Lecturer of internal medicine Faculty of Medicine, Fayoum University.

(4) Professor of Medical Microbiology and Immunology, Faculty of Medicine, Fayoum University.

Corresponding author: Hagar Saad Abdelrahman.

E-mail address: hagarsaadms@gmail.com , hsa06@fayoum.edu.eg

Tel: 01004343754

Fax:

ABSTRACT

Background: Hepatitis C viral infection (HCV) is endemic in Egypt with the highest prevalence rate in the world. Estimates for prevalence are based upon data reported from the 2008 and 2015 Egypt Demographic Health Surveys (EDHS). **Aim of the work:** To detect the prevalence of HCV infection in Fayoum University Hospital and compared it with previous results. **Methods:** The study was conducted from March 2017 to May 2018, four thousands,

four hundreds and ninety one subjects were selected from out-patients of Tropical medicine at Fayoum University Hospital. Subjects were examined for HCV antibody by Enzyme Linked Immune Sorbent Assay (ELISA), positive patients confirmed by real-time PCR. **Results:** Out of 4491 patients, 200 patients diagnosed as HCV infection which represent about 4.5%.

Conclusion: The decrease in prevalence of HCV infection from

14.7 % in 2008 and 10% in 2015, to 4.5% in 2018 was due to massive national diagnosis and treatment program.

KEY WORDS: prevalence of HCV, FAYOUM University, high AST, high cholesterol.

INTRODUCTION

Hepatitis C virus infection is a chronic blood-borne disease with an estimated 170 million chronically infected individuals around the world and more than 399,000 people dying every year from HCV-related liver diseases [1]. Nearly three quarters of infected individuals are living in middle income countries. Pakistan, China, Nigeria, India, Egypt, and Russia together accounted for more than half of total infections [2]. HCV is the leading cause of chronic hepatitis, liver cirrhosis and hepatocellular carcinoma (HCC). About 55%-85% of HCV infected cases become chronic active cases and pass through the way of developing fibrosis,

Cirrhosis, and may progress till become decompensated cirrhosis and HCC [1].

Egypt had the highest HCV prevalence in the world; in 2008, consistent with EDHS, that was conducted on a large nationally representative sample, HCV prevalence was 14.7% in 15-59 year age group, 10% chronic infection, 90% genotype 4 [3].

In 2015 according to (EHIS) , a significant reduction of 32% and 29% in HCV antibodies and HCV RNA positive individuals was reported respectively reaching 10% HCV sero-prevalence and 7% viremia, in the same age group. EHIS included younger age group and a sero-prevalence of 6.3% in 0-59 years age group was detected [4].

By 2030. Egypt has recognized the plan of action for the prevention, care and management of viral hepatitis. To complete the elimination goal in Egypt by 2030, community and health care system

cooperation should be occur. So we aimed to detect the problem in our hospital at present and we assessed the prevalence of HCV infection in Fayoum university Hospital and compared it with previous results.

PATIENTS AND METHODS:

This study conducted during the period from 2017 to 2018, subjects were selected from out-patients of Tropical medicine at Fayoum University Hospital. Patients who were suffering from liver diseases were subjected to the following: clinical assessment in form of full history, full clinical examination, routine liver function test (ALT and AST), total lipid profile (total cholesterol, triglycerides) and kidney function tests (urea and creatinine). Detection of HCV antibodies in patient serum was conducted by ELISA according to manufacture instruction (Abbott-Murex Biotech, Dartford UK) as the following: About 100µl of specimen diluent were pipetted to

the wells (leave 5 wells for controls and blank). We Pipetted 100µl of positive control into each of the two wells, and 100µl of negative control into each of the two wells, and we pipetted 100µl specimen diluent into the remaining well as a blank. Ten microliter of specimen was pipette to introduce to the assigned wells. (Do not add specimen to the blank well). The plate was sealed and incubated for 60 minutes at 37°C, then the microplate was washed with wash solution for 5 times(300ml/well/wash) and blot dried by pressing plate onto absorbent tissue. 100µl of conjugate was added to all wells of the microplate, then the microplate Sealed and incubated for 30 minutes at 37°C. The wash procedure was repeated as previous step. 50µl of Chromogen A and 50µl of Chromogen B were pipetted into each well (including the blank well). The plate was covered with a fresh plate sealer and Incubated at

37°C for 30 minutes in an incubator. The reaction was stopped by adding 50µl of stopping solution to each well (including the blank well) and mixing completely. The optical density was read using STAT FAX 2100 we put the plate in the microplate reader and read the absorbance of the solution in the wells at 450nm and 630nm. HCV positive cases by ELISA were confirmed by real time PCR according to manufacture. The protocol for real-time PCR to detect HCV RNA was performed as follow: Blood samples centrifugation for serum collection and storage at -20°C or -80°C until usage. RNA extraction from stored frozen samples was done using QIAamp viral RNA Mini kit (QIAGEN) according to the manufacture supplied with the kit. Extracted RNA was measured and quantitated with NanoDrop® (ND)-1000spectrophotometer (Nano Drop Technologies, Inc. Wilmington, USA).UV spectrophotometer at

260-280 wave length. An RT-PCR assay using TaqMan (fluorescence-based real-time PCR) and probes was designed for the quantitative determination of HCV RNA in the clinical blood samples. Absolute quantitation of the concentration of HCV RNA was based on an external standard curve (HCV Standards IU/ml) in the presence of an internal positive control (IPC). IPC was added to mixture of lysis buffer and sample material during RNA extraction of clinical blood samples.

The study was approved by faculty of medicine Fayoum University ethical community. Informed consent was obtained from all subjects to participate in the study.

Statistical analysis:

Data were collected and coded, then analysis was performed using SPSS (Statistical package for the social sciences) software version 22 (SPSS, Inc.). For quantitative data, one way ANOVA test was used as a test of significance to compare means. Qualitative data were presented as number and percentages; chi square (χ^2) or

Fisher's exact test, when appropriate, was used as a test of significance. Value 0.05 was considered significant.

RESULTS

The present study included four thousands, four hundreds and ninety one subjects from tropical outpatient clinics internal medicine hospital Fayoum University. All patients were subjected to full clinical assessment in the form of history, examination, routine liver function tests and detection of HCV antibodies in patient serum by ELISA and confirmed by PCR. There were about 200 patients infected by HCV virus from all 4491 patients visited the tropical clinics at Internal Medicine Fayoum University hospital in period from March 2017 to May 2018, and about 200 patients were positive by ELISA and RT-PCR prevalence represented in figure (1).

Demographic and anthropometric measure in HCV patients and normal population:

Date of patients included in the study were summarized in table (1)

and expressed in form mean± standard deviation (SD).

As shown in Table (2) cholesterol measures was higher in HCV infected patients when compared to those without HCV infection (P=0.023). As well, average of AST was higher in HCV patients when compared to those without HCV infection (P=0.0001).

Discussion:

Hepatitis C virus (HCV) infection is a major health problem in Egypt where the prevalence is the highest in the world [2]. This study was conducted to assess the prevalence of HCV infection in Fayoum university hospital and compare it with previous results. On World Hepatitis Day (July 28, 2016), the World Hepatitis Alliance (WHA) launched NO hepatitis, to support the elimination of viral hepatitis (i.e. 90% reduction in new chronic infections, 65% reduction in mortality) [2]. *Our result showed that prevalence of HCV patients was 4.5% among Fayoum*

University Hospital patients. The Demographic Health Survey (DHS) of 2008 showed a national seroprevalence of 14.7% among those aged between 15 and 59 years [3]. While the DHS of 2015 included the age groups 1–59 years showed the sero-prevalence was 10% [5].

The decrease in prevalence (4.5%) due to the national treatment and diagnosis program to diagnose and treat patients with HCV infection [6]. *The Egyptian national viral hepatitis treatment program is considered one of the most successful and effective public health programs. As an effect of this program more than one million patients were evaluated and more than 850,000 received treatment under the umbrella of the program since 2006 [2]. An another cause for reduction in prevalence was better infection control strategies, the directly acting antiviral drugs (DAAs) evolution.*

Our results in the present study, differed from the results revealed

an increased prevalence of anti-HCV (14.8%) and HCV-RNA (9.5%) among a total of 12,169 participants of wider age range (14–90 years) [7].

The results indicated statistical significant association between HCV infection and high level of AST enzyme, this finding agreed with liver damage occurred by HCV virus also [8] found significant relationship of elevated level of liver enzymes Our findings indicated that statistical significant association between HCV infection and high level of cholesterol level but this finding disagreed with [9].who studied the Mexican populations, and stated that: the interplay between lipids and hepatitis C virus (HCV) can modulate the course of HCV infection. Cholesterol improves the rate of sustained virological response and immune response against HCV. This contra verse could explained by human variability as the previous study

was among Mexican populations but our study among Egyptian patients. Also due to different viral serotype, stage and duration of disease.

Finally, HCV antibody prevalence appear to be declining rapidly so Screening and awareness promotions are needed to detect and treat buried HCV-RNA positive populations and prevent transmission. Decreases Mortality of persons infected with HCV could have contributed to the reduced prevalence of both HCV antibody and HCV RNA-positive persons[10].

Conclusion:

The large scale national treatment and diagnosis program lead to decrease of prevalence of HCV in Egypt from 10% in 2015 to 4.5% in 2018. It is recommended to continue national program for HCV diagnosis and treatment, and nationwide HBV vaccination until Egypt get rid of HCV.

References:

(1) WHO. (2016). Hepatitis C fact sheet no. 164 [updated July 2015].

[2] El-Ghitany E.M (2019) Hepatitis C Virus Infection in Egypt: Current Situation and Future Perspective. *Journal of High Institute of Public Health*;49 (1):1-9.

[3] El-Zanaty F, Way A. (2009) *Egypt Demographic and Health Survey 2008*. Cairo: Ministry of Health, El-Zanaty and Associates, and Macro International;431).

[4] El-Zanaty F, Way A. (2015) *Egypt health issue survey*. Ministry of Health and Population, Cairo, Egypt.

[5]. Ministry of Health and Population [Egypt], (2015). El-Zanaty and Associates[Egypt], ICF International. *Egypt Health Issues Survey* Cairo, Rockville. Ministry of Health and Population, ICF International; 2015.

[6]. Gomaa A, Allam N, Elsharkway A, El Kassas M, Waked I (2017) Hepatitis C infection in Egypt: prevalence, impact and management strategies: *Dove press journal*).

[7]El-Ghitany E.M. Farghaly E.G , (2019) Geospatial epidemiology of hepatitis C infection in Egypt 2017 by governorate Heliyon Aug 17;5(8):e02249.

[8]. Rajvanshi C, Tiwari AK, Dorwal P, Mehra S. (2019) Use of liver enzymes as a surrogate marker

for monitoring treatment of hepatitis C virus disease. *Glob J Transfus Med*;4:224-6.

[9]. Gonzalez-Aldaco, K., Roman, S., Torres-Valadez, R., Ojeda-Granados, C., Torres-Reyes, L. A., & Panduro, A. (2019). Hepatitis C virus clearance and less liver damage in patients with high cholesterol, low-densitylipoprotein cholesterol and *APOE ε4* allele. *World journal of gastroenterology*, 25(38), 5826–5837.

[10]. Kandeel A, Genedy M, El-Refai S, Funk AL, Fontanet A, Talaat M. (2017) The prevalence of hepatitis C virus infection in Egypt 2015: implications for future policy on prevention and treatment. *Liver Int.*;37(1):45-53.

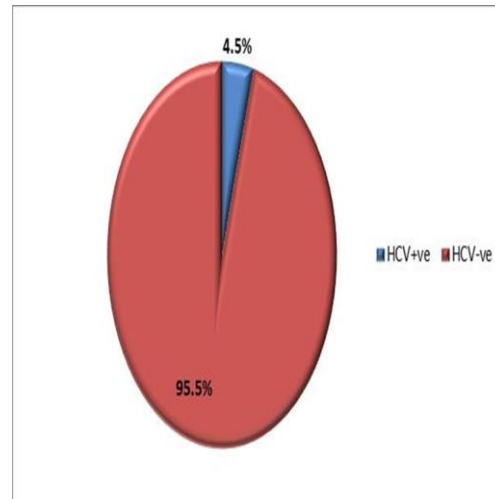


Figure (1): prevalence of HCV patients

Table (1): Demographic and anthropometric measure in HCV patients and normal population.

Variable	HCV positive (N=200)	HCV negative (N=4291)	P-value
<u>Demographic</u>			
Age (years) Mean ± SD	56.2 ± 8.9	53.5 ± 10.9	0.003 (S)
Sex: N (%)			
Male	128 (64.0)	2832 (66.0)	0.560 (NS)
Female	72 (36.0)	1459 (34.0)	
<u>Clinical data</u>			
Weight (kg) Mean ± SD	81.00 ± 14.10	85.84 ± 15.03	<0.0001 (S)
Height (cm)	165.36 ± 11.56	164.84 ± 8.51	0.407 (NS)
Waist circumference (cm) Mean ± SD	107.84 ± 12.05	105.56 ± 19.39	0.099 (NS)
Hip Mean ± SD	114.52 ± 14.13	113.84 ± 14.29	0.515 (NS)
Pulse Mean ± SD	93.40 ± 10.05	94.32 ± 7.91	0.113 (NS)
SBP Mean ± SD	135.60 ± 22.69	134.80 ± 17.45	0.535 (NS)
DBP Mean ± SD	87.20 ± 11.26	86.60 ± 6.93	0.248 (NS)

NS= no statistical significant difference, SBP=systolic blood pressure,
 DBP= diastolic blood pressure.

Table (2): Laboratory data of HCV positive patients and HCV negative patients.

Variable	HCV positive (N=200)	HCV negative (N=4291)	P-value
<u>Laboratory data:</u>			
Creatinine (mg/dl) Mean ± SD	1.1 ± 0.23	1.08 ± 0.39	0.472 (NS)
Cholesterol (mg/dl) Mean ± SD	235.84 ± 25.19	231.80 ± 24.53	0.023 (S)
AST Mean ± SD	33.84 ± 11.07	28.24 ± 8.78	<0.0001 (S)
ALT Mean ± SD	41.92 ± 19.03	40.16 ± 13.45	0.077 (NS)

AST=aspartate-aminotransferase, ALT=alanine aminotransferase, S= statistical significant difference, NS = no statistical significant difference

