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Research Article

Clinical Characteristics of HCV in Egyptian Patients

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Abstract

Aim: To identify the clinical presentation and characteristics of HCV patients. Egyptian patients.

Methods: The study is mainly descriptive study and included 640 chronic hepatitis C viruses. We included all patients in whom the diagnosis of HCV was confirmed by positive anti-HCV antibodies by enzyme-linked immunosorbent assay (ELISA) and positive HCV RNA by quantitative polymerase chain reaction (PCR) test over the 15 year period from 2000 to 2014. All patients were subjected to: Identification of the presenting complaint, detailed history and clinical examination, Serum samples were obtained and examined for: Complete blood CBC, AST, total serum bilirubin, direct serum bilirubin, albumin, PT, PC, INR, Creatinine, Alpha Fetoprotein, HCV viral load by quantitative PCR test, abdominal ultrasounds. Upper endoscope, Liver biopsy when possible, Triphasic CT abdomen were done when required. All patients were followed up regularly both clinically and laboratory. Types of treatment used were identified and recorded. APRI and Fib 4 scores were calculated in all patients. 59 patients were missed assessment during the follow the up period.

Results: 428 were males and 212 were females, the mean age at the time of diagnosis was 49.89 ± 11.22 (mean ± SD), 390 patients were residents of Cairo (60.9% of the total) and 250 patients (39.1% of the total) were not residents of Cairo (rural area of residency). The mean follow up duration was 5.18 ± 1.37 years. The presenting symptoms at the time of diagnosis were: Accidental diagnosis (60%), Fatigue (10.6%), Manifestations of liver failure (29.2%), Extra hepatic manifestations (1.7%). Only 79 patients (12.34%) received Pegylated Interferon/Ribavirin therapy. 50 patients were responders (63.29%) and 29 were non-responders (36.7). The total % of HCC among all patients was 10%. The mean follow up duration was 5.18 ± 1.37 years. History of Biharziasis was present in 300 patients (46.9%). Sixty nine out of the 300 patients with history of Biharziasis (69/300 = 23%) received oral treatment only and 231/300 = 77% received parenteral treatment ± oral treatment. History of surgical procedures was 11.25% and History of Blood transfusion was 6.09%. The disease progression during the follow up period was: Improving in 10.3%, Stationary in 62.7% and deteriorating in 17.8%.

Conclusion: The commonest presentation of HCV is asymptomatic and diagnosis is usually accidental. Liver cirrhosis and HCC are the most serious complications. Screening of all population may be required to give the treatment in early stages before the development of liver cirrhosis.

Keywords: *Hepatitis C Virus (HCV); Enzyme-Linked Immunosorbent Assay (ELISA); Polymerase Chain Reaction (PCR); Liver Cirrhosis*

Introduction

Hepatitis C virus (HCV) infection has become a global health challenge and in 2017, the World Health Organization assessed that 71 million people suffer from chronic (HCV) infection worldwide [1]. HCV infection is a major cause of liver cirrhosis and hepatocellular carcinoma (HCC) [1,2]. The prevalence of HCV infection is highest in Egypt ranging from 6% to 40% with an average of 14% [3,4]. This is greatly attributable to the era of parenteral anti-schistosomal therapy (PAT) mass- treatment campaigns between the period of 1960 - 1980 [4,5]. However, transmission still continues despite of termination of this program and implemented measures to reduce hospital-acquired infections [6].

The transmission of hepatitis C virus is still ongoing in Egypt and incidence rates have been estimated to be 0.8 - 6.8 per 1,000 person-years in several studies [7-10]. A study by Abu Raddad and Miller 2010, estimated that more than half a million people are infected every year, but the Egyptian Ministry of Health and Population estimated the number to be 100,000 persons per year [4,11]. The prevalence of chronic hepatitis C virus infection in Egypt is found to be higher among men than women (12% vs 8% respectively) [4,11]. It also appears to increase dramatically with age (> 25% among people aged > 50 years) [12] and is also found to be higher among people in rural than urban areas (12% versus 7% respectively) [11] with a male preponderance [13].

Genotype1a is most commonly detected in the United States and Europe whereas genotype 1b, currently the most common genotype, is distributed worldwide with a high prevalence in the United States and Europe as well as Japan [14,15]. HCV genotypes 2a and 2b are relatively common in North America, Europe, and Japan, while subtype 2c is commonly found in northern Italy. Genotype 3 is predominant in the Indian subcontinent, Southeast Asia as well as North America and parts of Europe. The subtype 3a is particularly prevalent in intravenous drug abusers in Western Europe and the United States [15]. HCV genotype 4 shows prevalence in North Africa and the Middle East, particularly Egypt and has recently spread to many European countries due to variation in population structure, immigration and routes of transmission. Similar regional patterns of endemic diversity has been found for genotype 5 in South Africa and Europe and for genotype 6 in Hong Kong and North America [16].

Egypt has the highest prevalence of HCV genotype 4 (particularly subtype4a), which is responsible for almost 90% of the total HCV infections [6,17]. This high prevalence of genotype 4 complicates the task of treatment, and is responsible for an increased incidence of chronic hepatitis, liver cirrhosis and hepatocellular carcinoma which is the second most frequent cause of cancer and cancer mortality in men [18,19].

Materials and Methods

The study is mainly descriptive study and included 640 chronic hepatitis C virus Egyptian patients. We aimed to identify the clinical presentation and characteristics of HCV patients.

We included all patients in whom the diagnosis of HCV was confirmed by positive anti-HCV antibodies by enzyme-linked immunosorbent assay (ELISA) and positive HCV RNA by quantitative polymerase chain reaction (PCR) test over the 15 year period from 2000 to 2014. Our hospital gastroenterology center serves patients from Cairo and also patients referred from all other parts of Egypt.

All patients were subjected to: Identification of the presenting complaint, detailed history and clinical examination, Serum samples were obtained and examined for: Complete blood count (CBC), aspartate aminotransferase (AST) alanine amino- transferase (ALT), total serum bilirubin, direct serum bilirubin, albumin, Prothrombin time (PT), Prothrombin concentration (PC %), INR, Creatinine, Alpha Fetoprotein (AFP), HCV viral load by quantitative PCR test, abdominal ultrasounds. Upper endoscope, Liver biopsy, Triphasic CT abdomen were done when required. All patients were followed up regularly both clinically and laboratory. Types of treatment used were identified and recorded. APRI and Fib 4 scores were calculated in all patients. 59 patients were missed assessment during the follow the up period. The protocol of the study was approved by the review board of the internal medicine department, Faculty of Medicine, Cairo University according to the declaration of Helsinki. This study was done in the faculty of Medicine, Cairo University, Egypt and all the patients were Egyptians. Nearly all Egyptian HCV infections (upwards of 95%) are genotype 4. Therefore we did not perform HCV genotyping.

Statistical methods

Data were statistically described in terms of mean ± standard deviation (± SD), and range, or frequencies (number of cases) and percentages when appropriate. Comparison of numerical variables between initial and follow up values was done using paired t test for paired (matched) samples. Correlation between various variables was done using Pearson moment correlation equation for linear relation in normally distributed variables and Spearman rank correlation equation for non-normal variables/non-linear monotonic relation. p values less than 0.05 was considered statistically significant. All statistical calculations were done using computer program SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) release 15 for Microsoft Windows (2006).

Results

The study included 640 chronic hepatitis C virus patients, 428 males and 212 females, their ages ranged from 21 to 80 years old at the time of diagnosis (mean ± SD = 49.89 ± 11.22), 390 patients were residents of Cairo (60.9% of the total) and 250 patients (39.1% of the total) were not residents of Cairo (rural area of residency). The base line characteristics of the patients are shown in table 1.

	Mean	Std. Deviation
Age at diagnosis (years)	49.89	11.22
Follow up duration (years)	5.18	1.37
HB (gm/dl)	11.91	2.07
TLC (10^9/L)	5,663.02	4,609.597
PLT (109/L)	161,924.14	81,393.416
AST (IU/L)	66.22	67.866
ALT (IU/L)	65.10	110.641
ALP (ng/ml)	115.06	78.887
Albumin (gm/dL)	3.675	0.7052
Total bilirubin (mg/dL)	1.478	1.9446
Direct bilirubin (mg/dL)	0.748	1.5402
PT	14.82	2.823
PC (%)	81.35	188.224
INR	1.63	4.954
Creatinine	1.084	0.7668
AFP (ng/ml)	36.98	224.133
HCV RNA by PCR (equivalents/ml)	853,452.92	761,023.722

Table 1: *Demographic and baseline characteristics of HCV patients at the time of diagnosis.*

Abbreviations: HB: Haemoglobin; TLC: Total Leucocyte Count; PLT: Platelets; AST: Aspartate Aminotransferase; ALT: Alanine Aminotransferase; ALP: Alkaline Phosphatase; PT: Prothrombin Time; PC: Prothrombin Concentration; INR: International Standardized Ratio; AFP: Alpha-fetoprotein; PCR: Polymerase Chain Reaction.

Presenting symptoms

The presenting symptoms at the time of diagnosis are illustrated in table 2.

Symptom	Number	Percent %
Accidental diagnosis	384	60
Fatigue	68	10.6
Manifestations of liver failure	187	29.2
Extra hepatic manifestations	11	1.7

Table 2: *Presenting symptoms at the time of diagnosis.*

The clinical findings, complications, other comorbidities at the time of diagnosis are shown in table 3.

300 patients had history of Biharziasis (46.9%). Sixty nine out of the 300 patients with history of Biharziasis (69/300 = 23%) received oral treatment only and 231/300 = 77% received parenteral treatment ± oral treatment.

Finding	Number	Percent %
History of Blood transfusion	39	6.09
History of surgical procedures	72	11.25
History of Biharziasis	300	46.9
Associated HBV	12	1.9
Diabetes Mellitus	206	32.2
Hypertension	147	23
Liver Cirrhosis manifestations	300	46.9
Encephalopathy	24	3.8
Splenomegaly	249	38.9
Ascites	96	15
SBP	2	0.31
Hematemesis/melena	24	3.8
HCC	30	4.7
Oesophageal varices	172	26.9
Unremarkable clinical findings	229	35.8
Lichen planus	2	0.3
Lymphoma	3	0.5
Arthralgia	2	0.3
Vasculitis	3	0.5
MPGN	1	0.2

Table 3: *Clinical findings: complications: other comorbidities at the time of diagnosis.*

Abbreviations: SBP: Spontaneous Bacterial Peritonitis; HCC: Hepatocellular Carcinoma; MPGN: Membranoproliferative Glomerulonephritis.

Abdominal ultrasounds and upper endoscopic findings

Abdominal ultrasound was performed to all patients at the time of diagnosis and upper endoscope was performed to 300 patients; the findings are illustrated in table 4.

Abdominal ultrasounds finding (N = 640)	Number	Percent %
Normal ultrasounds	44	6.9
Bright/fatty liver	97	15.2
Coarse liver	389	60.7
Ascites	99	15.5
Splenomegaly	343	56.2
Hepatomegaly	74	11.6
Hepatic focal lesion	55	8.6
PV thrombosis	7	1.1
Cholecystitis/gall stones	30	4.7
Periportal fibrosis	32	5
Splenectomy	5	0.8
Upper endoscopic finding (N = 300)	**Number**	**Percent %**
Normal	21	7
OV	172	57.3
PHG	56	18.6
Gastritis	30	10
Reflux	13	4.3
Hiatus hernia	21	7
Duodenitis	15	5

Table 4: *Abdominal ultrasounds and upper endoscopic findings at the time of diagnosis.*

Abbreviations: PV: Portal Vein; Spontaneous Bacterial Peritonitis; OV: Oesophageal Varices; PHG: Portal Hypertensive Gastropathy.

Type of treatment given

Only 79 patients received Pegylated Interferon/Ribavirin therapy, other types of treatment included; Liver supportive treatment (Silymarin), diuretics, anti-diabetic treatment, anti-hypertensive treatment and others as described in table 5.

Type of treatment	Number	Percent %
Pegylated Interferon/Ribavirin	79	12.3
Silymarin	591	92.3
Diuretics	99	15.5
Anti-diabetes mellitus treatment	206	32.2
Anti-hypertensive treatment	147	23
Others	32	5

Table 5: *Type of treatment given.*

Response to treatment

Only 79 patients (12.34%) received Pegylated Interferon/Ribavirin therapy. 50 patients were responders (63.29%) and 29 were non-responders (36.7). Comparison between the APRI and Fib-4 scores in responders and non-responders is shown in table 6.

	Responders	Non-responders	P value
APRI score (Mean ± SD)	0.62 ± 0.48	0.91 ± 32	0.0000
Fib-4 score (Mean ± SD)	1.29 ± 0.69	3.02 ± 1.03	0.0000

Table 6: *Comparison between the APRI and Fib-4 scores in responders and non-responders.*

Abbreviations: APRI: AST to Platelet Ratio Index; Fib-4: Fibrosis-4.

The disease progression during the follow up period was: Improving in 10.3% (66 patients) Stationary in 62.7% (401 patients) and deteriorating in 17.8% (114 patients). 59 patients (9.2%) missed assessment during the follow up period.

Percentage of Hepatocellular carcinoma among the studied patients at time of diagnosis and during the follow up period is shown in table 7.

Number of patients presented with HCC at the time of diagnosis	30/640 (4.7%)
Number of patients discovered to have HCC after examination, abdominal ultrasounds, AFP and documented by Triphasic CT	51/640 (8%)
Number of patients who developed HCC during the period of follow up	13
Total number of HCC	64/640
Total % of HCC among all patients	10%
Number of patients diagnosed with liver Cirrhosis on clinical examination	300
Number of patients diagnosed with liver Cirrhosis after Laboratory tests, Abdominal ultrasounds, Histopathology (when possible)	419
% of HCC among cirrhotic patients	15.3%

Table 7: *Frequency of HCC.*

Abbreviations: HCC: Hepatocellular Carcinoma; AFP: Alpha-fetoprotein; Triphasic CT: Triphasic Computed Tomography.

Calculation of APRI and Fib 4 scores was done for all patients at the time of diagnosis and after follow up as shown in table 9. There was statistical significant difference between the scores at the time of diagnosis and the follow up scores. Positive correlation was found between both scores.

	Mean	SD	Follow up		P value
			Mean	SD	
HB	11.91	2.07	12.63	2.1	0.042
TLC	5663.02	4609.59	5245.28	2820.32	0.219
PLT	161,924.14	81,393.416	141,242.64	73,868.205	0.000
AST	66.22	67.866	63.08	53.171	0.323
ALT	65.10	110.641	53.11	35.100	0.014
ALP	115.06	78.887	118.38	91.856	0.528
S Alb.	3.675	0.7052	3.255	0.7452	0.000
T.Bil	1.478	1.9446	1.702	2.4718	0.002
D.Bil	0.748	1.5402	1.225	5.3617	0.045
PT	14.82	2.823	15.11	3.844	0.422
PC	81.35	188.224	71.48	19.964	0.028
INR	1.63	4.954	1.78	0.554	0.027
Creatinine	1.084	0.7668	1.105	0.7888	0.521
AFP	36.98	224.133	238.69	2,307.808	0.093
PCR	853,452.92	761,023.722	952,554.57	512,113.476	0.757

Table 8: *Comparison between the laboratory findings at the time of diagnosis and the follow up laboratory findings.*

Abbreviations: HB: Haemoglobin; TLC: Total Leucocyte Count; PLT: Platelets; AST: Aspartate Aminotransferase; ALT: Alanine Aminotransferase; ALP: Alkaline Phosphatase; S Alb: Serum Albumin; T.Bil: Total Bilirubin; D.Bil: Direct Bilirubin; PT: Prothrombin Time; PC: Prothrombin Concentration; INR: International Standardized Ratio; AFP: Alpha-fetoprotein; PCR: Polymerase Chain Reaction.

	Mean	SD	Follow up		P value
			Mean	SD	
APRI	1.42	1.87	1.50	1.90	0.000
Fib-4	4.21	4.89	4.77	6.03	0.000

Table 9: *Comparison between the APRI and Fib-4 scores at the time of diagnosis and the follow up scores*

Abbreviations: APRI: AST to Platelet Ratio Index; Fib-4: Fibrosis-4.

Discussion

The present study showed an increased preponderance of chronic HCV infection among males (66.9%) as compared to females (33.1%) and this is in accordance with the results of a Japanese study by Yamakawa., *et al.* who found that HCV-RNA positive PCR was greater in men than in women [20] and other studies [21,22]. The mean age at diagnosis of chronic HCV infection was 49.89 ± 11.22 and this was in agreement with the study by Mohamoud., *et al.* who reported that HCV prevalence increases significantly with age with the highest rates observed among patients aged greater than 40 years [10]. The higher HCV prevalence in males could also be ascribed to the parenteral anti-schistosomal therapy in PAT campaigns, as males were the main target of these campaigns being more affected by the schistosomiasis disease burden [23].

Most of the participants in the present study were asymptomatic (60% of all participants) at the time of presentation and were accidentally discovered to have chronic HCV infection. The progression to cirrhosis usually occurs without symptoms and once it is recognized, the progression of the disease remains quite unpredictable; as cirrhosis may remain unnoticed for many years in some patients while may progress to liver decompensation and hepatocellular carcinoma in others [24]. The physical examination of the participants was remarkable for splenomegaly (38.9%) and manifestations of liver cirrhosis (46.9%). Oesophageal varices were detected endoscopically in 26.9%, while on the other hand, a considerable proportion of our patients had no remarkable findings on examination (35.8%).

A very small proportion (1.8%) of the patients presented with extrahepatic manifestations namely lichen planus, lymphomas, arthralgias, vasculitis, and membranoproliferative glomerulonephritis. This finding does not agree with the findings of a Bulgarian study by Stefanova-Petrova., *et al.* which reported a much higher prevalence (76.5%) of extrahepatic manifestations in patients with chronic HCV infection (104 out of 136 had at least one extrahepatic manifestation) [25] in comparison to the present study. They have identified 5 risk factors which were found to be linked to the extrahepatic manifestations by univariate analysis and included: female gender, age ≥ 60 years, extensive fibrosis, history of transfusion of blood or blood products and duration of infection ≥ 20 years. The findings of the latter study were also comparable to those reported in a large French prospective study, in which a prevalence of 74% of 1614 patients with chronic HCV infection had at least one clinical extrahepatic manifestation [26]. The discrepancy between findings of our study and those studies could be explained by the predominance of the male gender and a younger mean age of 49.89 ± 11.22 among the participants.

A large proportion of the HCV-infected participants (32.2%) in the current study were found to be diabetic at the time of presentation and this was in accordance with various case-control studies that reported an increased prevalence of type 2 diabetes (14.5%-24%) in patients with chronic HCV infection [27-29]. The study by Stefanova-Petrova., *et al*. also confirmed our finding as they reported a higher prevalence (22.8%) of type 2 diabetes in HCV infected patients when compared to the prevalence (8%) in the general population [25]. Moreover, a higher prevalence (14%) of type 2 diabetes was also observed in HCV patients with mixed cryoglobulinaemia when compared with HCV-negative age-matched controls and the general population in a study by Antonelli., *et al* [30]. The principal pathogenic mechanism involved in development of type 2 diabetes in patients with chronic HCV has been suggested, in recent studies, to be due to insulin resistance mediated by pro-inflammatory cytokines rather than deficient insulin secretion [31,32].

The past history of schistosomiasis and parenteral anti-schistosomal therapy in a great proportion of participants (46.9%) in our study was considered a significant risk factor for HCV infection; as the presence of other pathological processes affecting the liver may have an additive role in enhancing the progression of fibrosis in individuals with chronic HCV infection and this was in agreement with the results of Schwarzinger., *et al* [33]. A study by Sabah., *et al*. also reported a prevalence of 84% of chronic HCV infection among patients with history of schistosomiasis treated with PAT and a prevalence of 7.7% among patients treated orally [34].

In the current study only 1.9% of all participants had co-infection with HBV; this could have likely been underestimated due to the potential of occult HBV infection. Our finding was in agreement with the study by Aghemo., *et al.* which estimated the prevalence of HBV-HCV co-infection to be 2 - 10% in HCV positive patients but with marked geographical variability [35].

The total prevalence of HCC amongst the 640 participants in our study was 10%, considering those who were already diagnosed as having HCC at the time of presentation; those who were discovered to have HCC after thorough clinical examination, abdominal ultrasound, alpha-feto protein (AFP) quantification and a documented triphasic CT; and those who developed HCC during an average of 5.18 years follow up period. However an increased HCC prevalence of 15.3% was observed among participants with evident liver cirrhosis. This is in agreement with the studies by El-Serag., *et al.* and Fattovich., *et a*l. 2004 who reported an increased rate of 2 - 4% for HCC development in patients with HCV- related cirrhosis and even higher reported rates of up to 7% in Japan [36,37].

Abdominal ultrasound was performed to all 640 participants, and the majority of the patients (60.7%) showed a coarse echo-pattern and echo-texture of the liver and a considerable proportion (56.2%) had splenomegaly. There was almost an equal prevalence of ascites (15.5%) and bright liver (15.2%) on ultrasound examination. Hepatic focal lesion was sonographically detectable in only 55 out of 640 patients (8.6%). These findings are in accordance with those of Simonovsky 1999, who reported that the most common ultrasound findings in patients with cirrhosis were the presence of irregular surface and liver nodules and liver atrophy [38]. Our findings are also comparable to those of many retrospective studies which have reported the rates of cirrhosis to be 17 - 55% and HCC rate to be between 1% and 23% over an estimated infection period between 20-30 years [39-42]. Fontana., *et al*. suggested that cirrhosis can be diagnosed by ultrasound in 60%-80% of patients in the best hands [43].

Upper endoscopy was performed in only 300 patients; the presence of oesophageal varices was the most prevalent finding (57.3%) followed by portal hypertensive gastropathy (18.6%). These findings are in accordance with those of a study by Westbrook and Dusheiko who reported that the prevalence of upper gastrointestinal varices in patients with chronic HCV was 16% - 39% [24].

In the present study, only 79 out of the 640 patients were eligible to Pegylated Interferon-Ribavirin based treatment regimen; 50 patients out of the 79 showed a sustained virological response (SVR) and 29 patients were non-responders. This is in agreement with Ascione., *et al.* who reported a sustained virologic response (SVR) rate of 68% with the Pegylated Interferon-Ribavirin [44]. Similar trials by Rumi., *et al.* and Mira., *et al.* also showed consistent results [45,46]. Further studies by Hasan., *et al.* (2004) and Kamal., *et al.* (2005) have documented that treatment outcomes were better in genotype 4 chronic HCV patients with mild liver disease compared with patients who had advanced liver disease, This finding was consistent to our results as the APRI score was 0.62 ± 0.48 in responders and 0.91 ± 32 in non-responders more over the FB-4 score in responders was 1.29 ± 0.69 and 3.02 ± 1.03 in non-responders.

In the present study, the participants showed a significant decrease in their mean platelet count (p value < 0.000) as well as a significant deterioration of synthetic liver functions (albumin, bilirubin, prothrombin time and concentration) during the follow up period. The prevalence of thrombocytopenia in the study group could be explained by the large proportion of chronic HCV patients with cirrhosis (419 out of 600). The pathogenesis of thrombocytopenia could be largely attributed to platelet sequestration and destruction in the spleen [47,48] as well as low thrombopoietin production [49,50], moreover direct viral infection of megakaryocytes and auto-immune mechanisms have been postulated [51,52]. The finding of a significant decline in the prothrombin concentration (p = 0.028) during the follow up may be an indicator that the patient had advanced fibrosis or cirrhosis. Concordantly, the HALT trial which analysed the data of 667 chronic hepatitis C patients, which was a comparable number to our study, found that a multivariate regression model comprising platelet count, AST/ALT ratio, alkaline phosphatase and prothrombin time was predictive of liver cirrhosis [53]. A study by *Ghany*., *et al*. predicting the clinical outcomes in patients with chronic hepatitis C using baseline values of routinely available laboratory parameters (platelet count, AST/ALT ratio, total bilirubin and albumin) together with changes in these values during follow up, concluded that the baseline values and the rapidity in change of the value of these variables were significant predictors of clinical outcomes in patients with advanced chronic HCV [54]. Accordingly, monitoring the rate of change of laboratory variables would allow physicians to better predict the risk of a patient developing a clinical outcome such as hepatic decompensation and/or liver-related outcomes.

The recent development of highly effective oral direct-acting antivirals (DAAs) can greatly reduce HCV disease burden with the potential for eradicating this blood-borne virus as a public health problem [55, 56]. Egypt is considered the most affected country by HCV is. The Egypt Demographic and Health Surveys (EDHS) showed that antibody prevalence among the adult population aged 15 - 59 years is 14.7% [4] in 2009 and 10.0% [11] in 2015 which is higher than global levels [57]. In 2014 Egypt developed a national strategy for HCV control and established HCV prevention and treatment programs after successful negotiations for 99% discounted DAA prices, Egypt started a national HCV treatment program aiming to treat over 250,000 chronically infected individuals per year [58]. Clinical populations should be prioritized for screening [57] including high risk groups as patients with history of Biharziasis specially those received parenteral treatment, should be screened for HCV. Most countries that have an HCV epidemic focus screening in high-risk groups, however to reach the WHO eradication targets will require high screening and treatment coverage, especially in Egypt where infection is more generalised further than the high-risk groups. The Egyptian plan suggests that, with strong political and medical commitment, these ambitious targets can be grasped [59].

Limitations of the Study

The study was observational and the patients included were in the period from 2000 to 2014 and at that time the newly introduced DAA were not available at that time and the available treatment regimen was Pegylated Interferon/Ribavirin therapy. However the main strength of the study is that it included detailed information of a large number of HCV patients with a long follow-up duration.

Conclusion

The commonest presentation of HCV is asymptomatic and diagnosis is usually accidental. Liver cirrhosis and HCC are the most serious complications. Screening of all population may be required especially in Egypt to give the treatment in early stages before the development of liver cirrhosis.

Institutional Review Board Statement

The review board and the ethical committee of the Department of Internal Medicine, Faculty of Medicine, Cairo University approved the study protocol, which was performed according to the Declaration of Helsinki.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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