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Incidence of Chronic Hepatitis B and C Virus Infection in Damietta, Egypt

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Abstract

We investigated the incidence of Hepatitis B (HBV) and Hepatitis C (HCV) virus infection among patients with liver disease in Damietta Egypt from 2003 to 2005. Of the 146 liver patients studied, 25.3% had HCV and 8.9% had HBV. The incidence of HBV and HCV infection was greater in males than females, especially for HCV. There was a sharp increase in the number of cases of HCV in liver patients in 2005 compared with 2003 (2.2-fold higher in men and 2.3-fold higher in women). Over the years, the rate of HBV and HCV infection was higher in male than female patients (69.2 % versus 30.7% for HBV and 67.5% versus 32.4 % for HCV Alanine Amino-Transferase (ALT) **α** -glutathione-s- transferase were used a biomarker of Hepatocellular damage. IgG anti-HCV is related to the elevation of ALT levels and can be used as a serologic marker to indicate the presence of active HCV induced liver damage.

Keywords: Hepatitis B; Hepatitis C; Hepato cellular; Carcinoma; Liver patients

Introduction

Hepatitis is an infection of the liver caused by several viruses, the most common of which are Hepatitis A, B and C. Both Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) are spread mainly through contaminated blood and blood products, sexual contact and contaminated needles. Although there has been a decrease in the incidence of viral hepatitis over the last decade, it is still the most common cause of chronic liver disease worldwide [1-5]. Globally, the number of individuals infected with HBV has been estimated to be 350 million, 40% of whom may progress to cirrhosis, liver failure and hepatocellular carcinoma [3]. Approximately 170 million people worldwide are affected with HCV. It is the most common chronic infection in the United States of America (USA) and is responsible for 40% of chronic liver disease [4]. HCV infections are the principal cause of chronic liver disease, cirrhosis, carcinoma and liver transplantation. Over 17,000 people with chronic liver disease were listed for liver transplantation in 2003, with >10% expected to die before the operation [6]. Although viral hepatitis is a global health problem, there is a considerable variability in HBV and HCV rates between and within countries and between ethnic groups [2]. For instance, the prevalence of HCV in people with chronic liver disease has been estimated, 74% in Egypt [7]. Egypt has the highest countrywide prevalence of Hepatitis C Virus (HCV) in the world, with an estimated 8-10 million among a population of 68 million having been exposed to the virus and 5-7 million active infections. The infection with HBV or HCV among the positive patients has been persisting for some time before the appearance of the clinical symptom. These data will show the social importance of HBV and HCV infections in the region In Egypt, schistosomiasis was traditionally the most important public health problem and infection with *Schistosoma mansoni* the major cause of liver disease. From the 1950s until the 1980s, the Egyptian Ministry of Health (MOH) undertook large control campaigns using intravenous tartar emetic, the standard treatment for schistosomiasis, as community-wide therapy. This commendable effort to control a major health problem unfortunately established a very large reservoir of Hepatitis C Virus (HCV) in the country. By the mid-1980s, the effective oral drug, praziquantel, replaced tartar emetic as treatment for schistosomiasis in the entire country. This both reduced schistosomal transmission and disease and interrupted the "occult" HCV epidemic. It was evident when diagnostic serology became available in the 1990s that HCV had replaced schistosomiasis as the predominant cause of chronic liver disease. Epidemiological studies reported a high prevalence and incidence of HCV, particularly within families in rural areas endemic for schistosomiasis. Clinical studies showed 70% to 90% of patients with chronic hepatitis, cirrhosis, or hepatocellular carcinoma had HCV infections. Co-infections with schistosomiasis caused more severe liver disease than infection with HCV alone. Schistosomiasis was reported to cause an imbalance in HCV-specific T-cell responses leading to increased viral load, a higher probability of HCV chronicity, and more rapid progression of complications in co-infected persons. As complications of HCV usually occur after 20 years of infection, the peak impact of the Egyptian outbreak has not yet occurred. Efforts have been initiated by the Egyptian MOH to prevent new infections and complications of HCV in the estimated 6 million infected persons [8]. The Nile River has been an epicenter for schistosomiasis since antiquity. In 1980, an estimated 10% of the 200 million persons infected with *Schistosoma* were Egyptians. [9,10]. Two of the three most important human species of *Schistosoma* are endemic in Egypt: *S. haematobium,* which primarily causes disease in the urinary tract, and *S. mansoni,* which principally causes morbidity in the gut and liver. In 1851, Theodore Bilharz, for whom the clinical disease bilharziasis was named, first described the trematode during autopsy of a patient in Cairo. Leiper, working in Egypt from 1913 to 1918, established the connection between skin exposure to canal water and infection, confirmed the life cycle with the snail as the intermediate host, and that the terminal and lateral spine eggs came from separate species. The association of chronic liver disease, characterized by hepatosplenomegaly and portal hypertension with *schistosomiasis mansoni* was first made by William St. Claire Symmers, also while working at Kasr El Aini Hospital in Cairo, when he described clay pipe stem fibrosis in 1904 [11]. The aim of this study was to assess the incidence and impact of HBV and HCV infection in patients with liver disease in Damietta City which represents the biggest caustic in Egypt

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because it is located at Nile Delta at the end of the River Nile branch the population is 950 ,000 person. About 40% was infected by HBV and HCV.

Materials and Methods

This was a cohort hospital-based study in Damietta during the period 2003–2005. Information was gathered from the hepatitis disease registry of the general hospital or private clinic in Damietta with symptoms and signs of hepatitis. Viral hepatitis is classified into acute Hepatitis A (BI), acute Hepatitis B (BII), other Acute Viral Hepatitis (BIII), Chronic Viral Hepatitis (BV) and unspecified Viral Hepatitis (BIV) [10]. All cases of Acute and Chronic Viral Hepatitis B are classified under B-II and acute and chronic viral Hepatitis C is classified under B-V. From a total of 146 patients in Damietta with hepatitis documented over the study period. Their mean age was 48 years (range22 -68 years). We studied all patients with HBV and HCV infection. Differentiation between chronic HBV and HCV infection was based on the presence of classical ground-glass hepatocytes and positive staining for hepatitis B surface antigen in cases of HBV infection.

Evaluation

The following biochemical assays were performed: Serum α-GST, ALT, AST, S-GGT, Alkaline Phosphotase (ALP). Venous blood sample were collected and kept 30 min, at room temperature. The sample was centrifuged at 2500 r. p. m. for 20 min, and serum was separated. For internal quality control the following human based control sera are available: QN.0050CH with normal or close to normal control values. Serum samples were tested for anti-HCV according to the manufacturer's instructions with a second-generation enzyme immunoassay [EIA; Abbott GmbH, Delkenheim, Germany]. Sera were also tested for hepatitis B surface antigen [HbsAg] via EIA [Abbott GmbH, Delkenheim, Germany]. Chi-square test for trends was utilized with $p<0.05$ as significant. In order to compare the mean regional HCV seroprevalence, and continuous variables we used the person's correlation coefficient (r). The level of statistical significance was established at 0.05 with a statistical power of 80% [11]. Statistical analysis was performed using Spss statistical package for social sciences (Spss) according to [12]. The levels of parameters were analyzed by ANOVA; Mann-Whitney *t*-test was used for comparison between groups.

Results

Table 1 show the incidence of HBV and HCV infection per 146 patients with liver disease over each year of the study. Of the 146 patients with liver disease who were screened during the period 2003-2005, 37(25 men, 12 women) (25.3%) had HCV and 13 (9 men, 4 women) (8.9%) had HBV infection. In every year, HCV was more common than HBV. However, there was a notable increase in the incidence of HCV in patients with liver disease during recent years, reaching18 per 146 patients in 2005. Incidence of HBV it was 6 per 146 in the same year. The rate of HCV was higher in those of men (25) than in women (12) (17.12% for all the years combined versus 8.21 %).

Table 2 present the number of cases of Hepatitis B and Hepatitis C Virus infection reported patients with liver disease by sex during the period 2003-2005. There was a sharp increase in the number of cases of HCV in liver patients in 2005 compared with 2003 (2.2-fold higher in men and 2.3-fold higher in women). Over the years, the rate of HCV and HBV infection was higher in male than female patients (69.2 % versus 30.7% for HBV and 67.5% versus 32.4 % for HCV).

Table 3 shows the activity of AST, ALT, α-GST, GGT and Alkaline Phosphatase in patients with hepatitis C virus. Of the patients who were positive for HBsAg and anti-HCV positive patients had liver dysfunction as evidenced by (ALT, AST, **α** -GST, GGT, and ALP) levels. The mean value of serum AST and ALT of patients with Hepatitis C virus was increased 185.5 ± 14.64, 278.6 ± 13,75, 359.0 ± 10.and to 173.16 ± 13.94, 260.60 ± 15.43, 324.55 ± 7.15, the mean value of serum **α**-GST of patients with acute hepatitis was highly significantly increased to 37.25 ± 8.90, 58.8 ± 12.5, 91.92 ± 12.5985, the mean value of serum GGT in patients with acute hepatitis was significantly increased to 61.60 ± 5.65, 76.8 ± 5.58, and 93.29 ± 3.44 and the mean value of serum ALP of patients with acute hepatitis was highly significantly increased to :174.33 ± 8.996, 175.26 ± 15.39, and 236.80 ± 12.80 respectively.

Table 4 comparing the proportion of HBV and HCV among patients with liver disease in studies from different countries, the proportion of HCV in Egypt (74%) were different and very higher than to the proportion in Qatar (29.4%) Pakistan (29.0%) and India (31.5%). HBV, on the other hand, is relatively rare in Egypt and incidence was relatively lower than in the USA and the Far East.

Discussion

According to the estimate of the World Health Organization (WHO) [13] over 200 million people in 74 countries in the world are affected and 500-600 million are at risk of having schistosomiasis. Schistosomiasis or bilharziasis is a helminthic infection of the mesenteric, portal and pelvic venous system. The life cycle involves the human as definitive host and an aquatic snail as intermediate host. The main pathologic effects are the progressive damage to various organs

Variable	No of HVB(13) &,HCV(37) Infected	No of Total infected (50)	No of Liver disease (146)
Hepatitis B	**No %**	**No %**	**No %**
2003	3 23.07	3 6.00	3 2.05
2004	4 30.70	4 8.00	4 2.73
2005	6 46.15	6 12.00	6 4.10
Total	13 100.0	13 26.00	13 8.90
Hepatitis C			
2003	8 21.62	8 16.00	8 5.47
2004	11 29.72	11 22.00	11 7.53
2005	18 48.64	18 36.00	18 12.32
Total	37 100.0	37 74.00	37 25.32
Total	50 100.0	50 100.00	50 34.24

Table 1: Number of cases of hepatitis B and C virus infection reported in patients with liver disease during the period 2003-2005.

Variable	Male No %	Female No %	Total No
Hepatitis B			
2003	2 15.38	1 7.69	3
2004	3 23.07	1 7.69	4
2005	4 30.70	2 15.38	6
Total	**9 69.2**	**4 30.70**	**13**
Hepatitis C			
2003	5 13.51	3 8.10	8
2004	9 24.32	2 5.40	11
2005	11 29.72	7 18.91	18
Total	**25 67.5**	**12 32.40**	**37**
Total	**34**	**16**	**50**

Table 2: Number of cases of hepatitis B and C virus infection reported patients with liver disease by sex during the period 2003-2005.

Year	Cases	AST (U/L)	ALT (U/L)	α-GST (U/L)	GGT (U/L)	ALP (U/L)
2003	Patients (8)	185.5 ± 14.64†	173.16 ± 13.94†	37.25 ± 8.90*	61.60 ± 5.65†	174.33 ± 8.996*
2004	Patients (11)	278.6 ± 13.75†	260.60 ± 15.43†	58.8 ± 12.5**	76.80 ± 5.58†	175.26 ± 15.39
2005	Patients (18)	359.0 ± 10.85†	324.55 ± 7.15†	91.92 ± 12.59†	93.29 ± 3.44†	236.80 ± 12.80†

Values represent mean ± S.E of patients
0.05 compared to control values>*p
0.01 compared to control values>**p
0.001 compared to control values>†p
(control values recorded from Seronegativity patients)

Table 3: The activity of AST, ALT, α-GST, GGT and Alkaline Phosphatase in patients with Hepatitis C Virus during the period 2003-2005.

Country	HBV	HCV	Source
	%	%	
Qatar	2.5	29.4	[18]
USA	5 - 10	-	[12]
Singapore	10- 40	-	[14]
Italy	-	62- 74	[20]
India	-	3.0 -31.5	[17]
Pakistan	-	29	[21]
Egypt	-	74	[7]

USA = United States of America

Table 4: Virus (HBV) and C Virus (HCV) infection among patients with liver disease in different countries.

resulting from immunologic reactions to the eggs and the parasite deposited in the tissue. The hepatic fibrosis and portal hypertension occur in the intestinal form, while obstruction and superimposed infection occur in the urinary form. Hepatitis C virus (HCV) has been identified as the major etiologic agent of post-transfusional and sporadic non-A, non-B hepatitis and contains a positive-stranded Ribonucleic Acid (RNA) genome [14]. The WHO estimated that almost 170 million people, equivalent to 3% of the world's population, have been exposed to HCV [15]. The prevalence of HCV infection has been investigated in a number of countries and wide variations (1-5.5%) have been reported [16]. The highest prevalence rate of 20% has been reported among Egyptian nationals [17,18]. Concurrent infection with HCV and *Schistosoma mansoni*, is the major cause of chronic liver disease and liver cirrhosis [19,20]. Viral hepatitis is the most common cause of chronic liver disease throughout the world [21,22]. Chronic HBV accounts for 5%-10% of cases of chronic liver disease and cirrhosis in the USA [21]. In our study, 43.14% of patients with liver disease had HCV or HBV. A study in Singapore showed that chronic HCV- and HBV-related liver disease constituted 57% of all indications for adult liver transplants [23]. A study in Romania on chronic HCV and HBV infections showed that an association with chronic liver disease was seen in half the patients [24]. A study in Qatar showed that chronic HCV- and HBV-related liver disease constitutes 31.9% [25]. In Singapore the prevalence of HBV related liver diseases was high, which was not surprising as HBV is endemic with a 4.1% carrier rate and complication developing in 10% - 40% of patients with chronic HBV [23]. In Qatar, HBV was relatively rare, 2.5%; HCV was more common in patients with liver disease (29.4%). In contrast, HCV is relatively rare in Singapore and in parts of Asia [26]. In addition, studies from India have shown a prevalence of HCV of 3%-31.5% in patients with cirrhosis and chronic liver disease [27,28]. However, clinical studies from southern Europe and the USA have shown a high percentage of HCV infection in patients with cirrhosis [23], which is consistent with our findings. There is considerable variability in the prevalence of HBV and HCV between different countries and ethnic groups. For instance, the prevalence of HCV in people with chronic liver disease has been estimated, at 62%-74% in Italy [29], 74% in Egypt [7] and only 29% in Pakistan [30]. It is evident from the study findings that HCV is a major cause of chronic liver disease in Egypt. Poynard, Bedossa and Opolon reported that approximately 300 million people infected worldwide with HCV will progress to cirrhosis or liver failure, and would need a transplant in the future [31].

Alanine Amino-Transferase (ALT) levels in the blood may rise to twenty above normal. Excess (ALT) leaks into the bloodstream when liver cell are injured or dying [32-34] reported that in acute hepatocelluler injury such as infection and toxic hepatitis, Alanine Amino-Transferase (ALT) and Aspartate Aminotransferase (AST) levels may increase 20 to 50 fold, even up to100 fold of the upper limit of normal range. Our results are in accordance with [35] during acute HCV infection [36] reported that elevated aminotransferase suggest hepatocellulare damge. In severe viral hepatitis that causes extensive acute necrosis [37] reported that AST levels are highest in acute hepatocellular disorders. In viral hepatitis, levels may reach 100 times. The mean value of serum (AST) of patients with chronic hepatitis was increased to 309 ± 13.26 these results are in accordance with [38]. The mean value of serum Gamma glutamyl transferase (S-GGT) in patients is in accordance with many authors [36] reported that in acute infection hepatitis, S-GGT elevation is moderates (2-5 folds 24.77 ± 11.28. These results are in agreement with [39] who reported that **α** -GST is more frequently elevated than AST in chronic active hepatitis increase and is less useful than ALT levels. The mean value of serum Alkaline Phosphatase (ALP) in patient with acute hepatitis is in accordance with [40] in chronic hepatitis, the mean value of alkaline phosphatase in patients with chronic hepatitis was increased to 207.59 ± 12.45. These results are in good agreement with those of [37] who reported that slight to moderate increase in (ALP) activity occur in many patients with hepatocellular disorders, such as hepatitis and cirrhosis, chronic hepatitis and transient increases may occur in all types of liver disease. **α** -glutathione-s- transferase may be as good serologic marker of hepatocellular damage because of its low molecular weight. The mean value of serum **α**-GST of patients with acute hepatitis was in accordance with those of [41] that plasma **α**-GST increased earlier than liver transaminase levels, α-GST may be used in monitoring hepato

cellular damage during the progression of sepsis. In Chronic Hepatitis: the patient mean value of serum **α**-GST was increased to 24.77 ± 11.28. These results are in agreement with [39] who reported that **α**-GST is more frequently elevated than AST in chronic active hepatitis.

Conclusion

The present study findings revealed that over 43.14 % of patients in Damietta Egypt with liver disease had viral HBV or HCV, with HCV playing the greater role, HBV and HCV infection are both preventable. In order to limit the spread of hepatitis, efforts must be directed at minimizing exposure to sources of infection. Further studies are necessary to evaluate the sociodemographic and other associated risk factors involved with HBV and HCV infection in patients with liver disease. From a molecular epidemiologist viewpoint, the prevalent HBV and HCV genotypes and subtypes (e.g., HBV genotypes A-H, HCV genotypes 1-6) should be reported in future studies.

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