

Prevalence of hepatitis C virus among bilharziasis patients

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ABSTRACT

Objective: Hepatitis C virus (HCV) infection with concurrent *Schistosoma mansoni* infestation has emerged as a major cause of chronic liver disease and liver cirrhosis. The aim of this study was to investigate the prevalence of HCV among bilharzia patients.

Method: The study was conducted at the Viral Diagnostic and Parasitology Departments, Regional Laboratory and Blood Bank, Dammam, Kingdom of Saudi Arabia from August 1999 to July 2000. Sera from a total of 405 patients, including 356 Saudi nationals and 49 non-Saudis, who had a clinical suspicion of bilharziasis were tested, using enzyme linked immunosorbent assay for HCV infection and indirect hemagglutination tests for *Schistosoma* infestation. Diagnosis of schistosomiasis was made when serum anti-schistosoma antibody titer was either equal to or more than 1:256.

Results: A total of 39 cases out of 405 tested positive for bilharzia antibodies comprising of 22 (44.9%) non-Saudi and 17 (4.8%) Saudi individuals. Among these patients 7(17.9%) were found to have evidence of HCV infection. Of the 7 patients tested positive for HCV antibodies, there were 4 (26.7%) Egyptians, 2 (11.8%) Saudis and one (14.3%) Middle-Eastern.

Conclusions: Our data shows that a good proportion (17.9%) of patients with bilharziasis had HCV infection. The percentage positive for HCV antibody were 26.7% in Egyptians, which is higher when compared to other nationals and Saudis.

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According to the estimate of the World Health Organization (WHO),¹ 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 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.² The WHO estimated that almost 170 million people, equivalent to 3% of the world's population, have been exposed to HCV.³ The prevalence of HCV infection has been investigated in a number of countries and a wide variations (1-5.5%) have been reported.⁴ The highest prevalence rate of 20% has been reported among Egyptian nationals.^{5,6} Concurrent infection with HCV and *Schistosoma mansoni*, is the major cause of chronic liver disease and liver cirrhosis.^{7,8}

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Methods. This preliminary study was conducted at the Viral Diagnostic and Parasitology Departments, Regional Laboratory and Blood Bank, Dammam, Kingdom of Saudi Arabia (KSA) from August 1999 to July 2000, to investigate the prevalence of HCV infection among patients with *Schistosoma* infestation. Blood samples were collected by venipuncture from 405 individuals with a clinical suspicion of schistosomiasis. There were 310 males and 95 females with a mean age of 35.3±10.3 years (range 15-55 years). Ten milliliters of blood was collected in a sterile tube and was allowed to clot at room temperature for 2 hours. Serum was obtained by centrifugation and stored at 20°C, until used. Antibodies to *Schistosoma* were detected using commercially available indirect hemagglutination (IHA) test kit (Behring Diagnostics Incorporation, Marburg, Germany), in accordance with the instructions of manufacturer. The IHA test is a sensitive test to detect bilharziasis, but it does not differentiate between past and recent infection or between *Schistosoma mansoni* and *Schistosoma hematobium*.¹¹ A titre of 1:256 or more was considered as positive. Antibodies to protein expressed by C100-3, C 33 C, C 22 3, and 5-1-1 clone regions of HCV genome were detected by enzyme linked immuno-sorbent assay kit. We used Abbott's HCV, EIA second generation kits (Abbott Germany). The repeated reactive (RR) specimens were re-evaluated by supplemental tests using hepatitis C virus encoded antigen (Recombinant 5-1-1-, C-100-3 and C-22-3); CHIRON RIBA, HCV 2.0, strip immunoblot assay, (Chiron Corporation, Ortho Diagnostics system, New Jersey 08889, USA). All the recombinant immunoblot assay (RIBA) positive specimens were taken as the basis of our HCV diagnosis. Diagnosis of HCV infection was made when the sera sample was tested positive by RIBA. Sera from 300 healthy blood donors were also tested as control group for *Schistosoma* IHA test and HCV test. None of the individuals were positive for either *Schistosoma* antibody or HCV antibody tests.

A stool sample from each patient tested positive by IHA, was collected in a wide mouth, clean plastic container. Direct saline and iodine smears were made and examined for ova, cyst and parasite prior to concentration method. "Fecal Parasite Concentrator" (FPC) kit (Evergreen, USA), was used. Concentration of the stool specimens was carried out according to manufacturer's instructions.

Results. Out of 405 patients tested, 356 (87.9%) were Saudis and 49 (12.1%) were non-Saudis. Among the non-Saudi population 31 (7.7%) were Egyptians and 18 (4.4%) belonged to Middle-Eastern countries other than Saudi Arabia and Egypt. **Table 1** shows the results of initial screening of all sera for bilharzias antibodies by

Table 1 - Patients positive for schistosoma and HCV antibodies.

Nationality	N of patients	Total IHA <i>Schistosoma</i> antibodies positive n (%)	N of HCV antibodies positive n (%)
Saudi	356	17 (4.8)	2 (11.8)
Egyptians	31	15 (48.4)	4 (26.7)
Middle-Eastern	18	7 (38.9)	1 (14.3)
Total	405	39 (9.6)	7 (17.9)
HCV - Hepatitis C virus, IHA - Indirect hemagglutination			

IHA. Of the 405 sera, 39 (9.6%) were positive for bilharzias antibodies, 22 (44.9%) were non-Saudis and 17 (4.8%) were Saudis. Hepatitis C virus antibodies were present in 7 (17.9%) out of the 39 IHA bilharzias antibody positive individuals. Of 22 non-Saudis 15 (38.5%) were Egyptians, 7 (17.9%) were Middle Eastern. On the microscopic examination of 39 stool specimens of patients with schistosomiasis, *Schistosoma mansoni* ova was seen in 25 (64.1%) individuals.

Discussion. Schistosomiasis enhances several viral infections of the liver,¹⁰⁻¹² and it may enhance HCV infection of the liver or replication in the liver and induce a robust antibody response that is more readily detectable by HCV sero-assays. Co-occurrences of these 2 infectious agents has already been reported.¹³⁻¹⁵ The *Schistosoma* may enhance hepatitis virus by modulating the cytokine system in the liver.¹⁶⁻¹⁸ The increase of Th2 cytokines and the decrease of Th1 cytokines could inhibit a protective intra-hepatic cytotoxic T-lymphocyte response to HCV and promote viral replication, liver damage and enhance antibody production.¹⁹ Our study demonstrates that the patients with schistosomiasis has high prevalence of serologically confirmed HCV antibody indicative of past or current HCV infection. Out of 39 serological positive *Schistosoma* patients 17.95% were positive for HCV antibody. Although in small numbers, the percentage that was positive for HCV antibody was 26.7% in the Egyptians when compared to patients from Middle-Eastern (14.3%) and Saudis (11.8%). In a recently published report the association between HCV and bilharziasis was 60% of the studied Egyptian population.^{7,20} The hypothesis that HCV association in Egyptian may be related to

genetic susceptibility or to different HCV sub-types. Much is known about the heterogeneity of HCV genome, as there are at present 6 known major geno-types and over 90 sub-types assumed to be prevalent in different parts of the world.²¹⁻²³ The HCV genotype 4a is the most common genotype in Egyptian population,²⁰ that may be responsible for predilection of Egyptian population for HCV infection. Another theory has surfaced in Somalia, as a high HCV prevalence, it was apparent among those with high prevalence of intestinal parasites or bilharzia hematobium or both. This association may be due to autoantibodies or high level of gamma globulins or both in the sera of these patients, this may result in interference with HCV tests leading to more false positive results.²⁹⁻³⁰

This is a preliminary study carried out by us, further large scale studies are recommended to conclude the findings.

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