Age-specific Prevalence of Antibody to Hepatitis C Virus (HCV) Among the Saudi Population

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The age-specific prevalence of antibody to hepatitis C virus (anti-HCV) was studied in 2510 Saudis at two different hospitals in Riyadh Saudi Arabia. This sample included 152 children (87 males, 65 females aged 1–17 years) and 358 blood donors (227 males, 131 females aged 18–56 years) at King Khalid University Hospital (KKUH), and 2000 blood donors (1907 males, 93 females) at the Security Forces Hospital (SFH). The prevalence of anti-HCV in apparently healthy Saudis (without overt liver disease) increased with age reaching a peak of 5.0% in those over 50 years of age. The range of anti-HCV in our population (2.2–5.0%) is higher than that reported from many Western countries. Although the blood samples at KKUH were tested by enzyme-linked immunosorbent assay (ELISA) from Ortho Diagnostic, while blood samples from SFH were tested by Abbott’s ELISA second generation technique, the proportion of positives in the 20–50-year-old age range was not significantly different between the two sets ($\chi^2 = 1.62$). The fact that none of our patients had a history of blood transfusion or parenteral drug addiction indicates that the non-parenteral route is a major route of HCV infection among Saudis. This non-parenteral route however, needs to be clearly defined.

A virus causing parenterally transmitted non-A, non-B hepatitis (NANBH) and sporadic NANBH of unidentified causes have been reported recently$^{1,4}$ and the name hepatitis C virus (HCV) has been suggested.$^{5,6}$ This virus has a diameter of less than 80 nm and has been shown to have a lipid envelope and a single-stranded positive-sense 10 kb RNA molecule and is classified as a togavirus or flavivirus.5-7 The recombinant HCV antigen (C100-3) of the prototype anti-HCV radioimmunoassay developed by Chiron (Emeryville, CA, USA)$^4$ is now available as an anti-HCV enzyme linked immunosorbent assay.
(ELISA)\(^8\) which can be used for screening blood and blood products. Employing this assay many investigators have showed that HCV is a major cause of transfusion-associated NANBH throughout the world and the prevalence to anti-HCV varied from less than 1% to 1.7% in most blood donor studies in different populations in the USA, Japan and Europe.\(^{8-16}\) Data from the Center for Disease Control (CDC) show that 5–10% of reported patients with NANB have a history of blood transfusion, 40% of the patients have a history of parenteral drug use, and 40% have no known history of infection.\(^7\) The virus has a long incubation period (60 days) it is mild and often subclinical.\(^7\) Increasing evidence indicates that HCV infection is associated with the risk of developing chronic hepatitis, cirrhosis and primary hepatocellular carcinoma (HCC).\(^7,13,14,18-21\) Antibodies to HCV were found in 29% of patients with HCC compared to 0.65% in healthy controls in South Africa.\(^22\) In the USA 75% of individuals with long-term biochemical and histological evidence of chronic NANBH have antibodies to HCV.\(^6\)

Our recent findings of the relatively high prevalence of anti-HCV, viz: 5.3% in the general Saudi population\(^23\) has prompted us to study the age-specific prevalence to this virus among Saudis and see at what age exposure to the virus take place. The prevalence and epidemiological significance of anti-HCV in different age-groups is the subject of this paper.

### Patients and Methods

The study included 2358 Saudi blood donors (age 18–56 years) of whom 358 (227 males, 131 females) donated blood at the King Khalid University Hospital (KKUH), Riyadh, between November 1990 and February 1991 and 2000 (1907 males, 93 females) who donated blood at the Security Forces Hospital (SFH) Riyadh, between June 1990 and May 1991. The donors were selected at random. Also included were 152 children and young adults (87 males, 65 females, 1–17 years) who were admitted to KKUH during the same period for conditions other than liver disease and on whom no HBsAg or hepatitis A virus investigations were requested.

The sera from KKUH were tested for anti-HCV by enzyme immuno-assay (EIA) (Ortho Diagnostic Systems, Raritan, New Jersey, USA), and the sera from SFH were tested for anti-HCV by second generation EIA (Abbott Diagnostic System, North Chicago, Ill., USA). The EIA tests were performed on the same day the sera were sent to the laboratory. Samples which were positive were repeated in duplicate and were considered true positive if at least two further tests determination were also positive. Confirmation assays (e.g. radioimmunoblot assay or polymerase chain reaction) were not performed.

### Results

The results are shown in Table 1. There was a consistent increase with age. The prevalence of anti-HCV was not statistically different between the sexes. In the 2000 blood donors age 20–>50 years tested at SFH, 51 (2.5%) positive anti-HCV cases were found. The proportion of anti-HCV-positives in the 20–>50-year-old group was not significantly different using the two EIA methods ($\chi^2 = 1.62$).

Table 2 shows the prevalence of HCV-antibodies in apparently healthy (i.e. without overt liver disease)

### Discussion

The data show that the prevalence of anti-HCV in apparently healthy (i.e. without overt liver disease)
Saudi children and adults suggests that the population of Riyadh, Saudi Arabia is exposed to HCV infection. The seroprevalence of anti-HCV has been reported to increase with age; older donors were more likely to be positive than the young.\textsuperscript{15,24} These data are in agreement with the present study as exposure starts in early life (less than 10 years) and increases with age reaching a peak in people more than 40 years of age and in both sexes. The results of this study confirm an earlier report of the endemicity of HCV in the Saudi population\textsuperscript{23} and show that the early acquisition of HCV among Saudis is also similar to the pattern of acquisition of HBV infection.\textsuperscript{25,26} Although in persons over 20 years of age one set was tested by Ortho first generation EIA while another set was tested by ABBOTT second generation EIA, the proportion of positives was not significantly different ($\chi^2 = 1.62$). It is important to note that anti-HCV in our healthy population (2.5–3.5%) is higher than those reported elsewhere except in Spain where it varied from 1.2%\textsuperscript{10} to 7.3%.\textsuperscript{18} The prevalence of anti-HCV in healthy blood donors from different parts of the world are summarized in Table 2.

Studies from France, Italy, and Germany showed variation in the prevalence of anti-HCV between different regions of the same country. For example, the prevalence of anti-HCV in north of Germany was 0.24% compared with 0.79% (central) and 0.83% in the south.\textsuperscript{11} In northern Italy 0.68%, in the south 1.38%.\textsuperscript{24} In north France 0.70%, in the east 0.81%, in the west 0.52% in the south 0.53%.\textsuperscript{27} This variation could be due to environmental factors which would be involved directly in the pathogenesis of HCV or indirectly by togavirus cross-reactivity with HCV.\textsuperscript{11} Whether this variation exists in Saudi Arabia is still to be determined.

We are in the process of investigating the role of HCV in different categories of Saudi patients. Furthermore, we are investigating the mode of transmission of HCV among Saudis. None of our patients had a history of blood transfusion and there was no history of parenteral drug addiction. Our preliminary observations indicate that a non-parenteral route is likely to be the major route of HCV infection among Saudis. However, this non-parenteral route has to be defined by studying larger numbers especially of children and people from various socioeconomic groups.

The second generation EIA used here is more sensitive and specific than first generation EIA. Recently, it was recognized that on the outside of the non-structural C100-3 region of HCV genome, there are additional antigenic targets which can be recognized by the second generation EIA which is based on recombinant non-structural and structural antigens.\textsuperscript{28} A specific and sensitive test for anti-HCV would improve the safety of blood supply and provide an important clinical diagnostic tool. Furthermore, many investigators feel that the test makes the use of surrogate markers in prevention of NANB unnecessary as surrogate assays for anti-HBCAg and ALT could detect only 20–50% of the anti-HCV positive blood donors involved in the transmission of NANBH.\textsuperscript{13,21,27} and it has been observed that significant number of patients who lacked the surrogate markers developed NANBH.\textsuperscript{4}

Because HCV is endemic in the Saudi population therefore routine screening for anti-HCV on all blood donations is already implemented. This will greatly reduce the risk of transmission of NANBH and its sequelae among the Saudi population.\textsuperscript{8,13,27,29,30}

References


