Hepatitis C virus infection in urban and rural Natal/KwaZulu

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Abstract **This study was undertaken to estimate the prevalence of hepatitis C virus (HCV) infection in urban and rural blacks in Natal/KwaZulu. Sera from representative community-based samples comprising 176 urban and 441 rural black adults were tested for the presence of anti-HCV. The prevalence of HCV infection was 1,7% (95% confidence interval 0 - 3,6%) among urban and 0,9% (95% confidence interval 0,1 - 1,7%) among rural blacks. Four (0,9%) of the 466 subjects with evidence of current or past hepatitis B virus (HBV) infection and 3 (2%) of the 151 with no evidence of HBV infection were anti-HCV-positive. The prevalence of HCV infection was low in contrast to the high prevalence of HBV infection among urban and rural blacks in Natal/KwaZulu. This suggests that HCV does not have the same main routes of transmission as HBV in this region. Larger scale studies are needed to explore this hypothesis.**

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Hepatitis C virus (HCV) is considered an important cause of non-A, non-B hepatitis.[1] After extensive research[2-4] which demonstrated that HCV is transmitted via blood and blood products, routine blood donor screening has been instituted in several countries. However, common risk factors for HCV and hepatitis B virus (HBV) infection extend beyond blood transfusions to include haemodialysis,[5] intravenous drug use,[6] sexual contact and health care employment.[7]

Although there are no reliable data on non-A, non-B hepatitis, the high prevalence of HBV infection in Natal/KwaZulu[8,9] (4,4% among females and 7,1% among males[9]) suggests that HCV infection is also likely to be common in this region. An indication of the importance of blood transfusions as a mechanism for the spread of HCV is the 3% prevalence of HCV infection among black blood donors in Natal/KwaZulu (personal communication – Professor F. Fernandez-Costa).

A seroprevalence survey[10] among high-risk patients at King Edward VIII Hospital, Durban, found that 59 (46%) haemophiliacs, 48 (4%) patients on haemodialysis and 49 (10%) patients with hepatocellular carcinoma were anti-HCV-positive. However, there are no estimates of the prevalence of HCV infection based on representative samples of urban and rural communities in Natal/KwaZulu.

The purpose of this study was to estimate the prevalence of HCV infection in urban and rural Natal/KwaZulu. It was undertaken to assess the feasibility of a larger project to study transmission mechanisms responsible for the spread of HCV in the community.

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Materials and methods

In 1985, community-based studies to estimate the prevalence of HBV infection among black adults were undertaken in Mseleni, a rural area,[9] and in Umlazi, an urban township.

Urban sample

Umlazi, a large black township just south of metropolitan Durban, comprises 26 sections each denoted by a letter of the alphabet. In 3 randomly selected sections, sequential sampling was used to identify a total of 200 houses to be visited. Houses were visited during working hours and over weekends. If no one was present at a selected house after two visits, then the next nearest house was visited. One randomly selected person over the age of 12 years from each house was invited to participate in this study. After consent was obtained, demographic information was recorded and 5 ml blood were collected by means of antecubital venepuncture. The blood specimens were centrifuged and tested for hepatitis B surface antigen (HBsAg) and antibodies to hepatitis B core antigen (anti-HBc) within 72 hours of being collected (AUSRIA and CORAB; Abbott Laboratories, Chicago, USA).

Rural sample

Mseleni, a rural area in northern Natal/KwaZulu, had approximately 1 000 households in 1985.[9] About 60% of these were accessible by means of a 4-wheel drive vehicle. At these households one randomly selected person above the age of 12 years was invited to participate in the study. A total of 441 subjects agreed to participate. After consent was obtained, they were interviewed and a 5 ml tube of blood was drawn. Blood specimens were centrifuged within 24 hours and the sera stored at -20°C until transported to Durban on dry ice for HBV serological tests.

Testing for anti-HCV

After tests for HBV serological markers were performed, the sera were stored at -20°C until they were tested for anti-HCV in June 1991. Two commercially available enzyme immunoassay (EIA) kits were used and the manufacturer's instructions were followed (Abbott HCV EIA — 2nd generation and HCV Neutralisation EIA; Abbott Laboratories, Chicago, USA). All specimens found to be reactive by HCV EIA initially were retested. Repeatedly reactive specimens were then subjected to the HCV Neutralisation EIA. The manufacturer's criteria were used to interpret the results of HCV Neutralisation EIA. Specimens which produced a positive result on the HCV Neutralisation EIA were regarded as anti-HCV-positive; the remainder were regarded as false-positives.

Statistical tests

EPI-INFO Version 5 was used to analyse the data. χ^2-tests and 95% confidence intervals (CI) were calculated by means of standard methods.

Results

The prevalence of HCV infection was 1,7% (CI 0 - 3,6%) among urban and 0,9% (CI 0,1 - 1,7%) among rural blacks. This finding was not statistically significant.

Twenty-four of the 200 subjects from Umlazi declined to participate, giving a response rate of 88% for the urban sample. Thirty-five (19,9%) of the 176 specimens from urban subjects were found to be repeatedly reactive on EIA; only 3 of these were positive on HCV Neutralisation EIA. The 3 subjects who were anti-HCV-positive were a 49-year-old woman and 2 men, aged 29 and 65 years.

The response rate for the rural sample could not be calculated accurately but was estimated to be between 60% and 70%.[9] Thirty-eight (8,6%) of the 441 specimens from rural subjects were repeatedly reactive on HCV EIA. Of these, only 4 produced positive HCV Neutralisation EIA results, in 3 women aged 50, 52 and 62 years and a 75-year-old man.

Women comprised 59,7% and 77,6% of the urban and rural subjects respectively. The mean age of the urban subjects was 34,2 years (14,4; range 13-69) and that of the rural subjects 43,9 years (16,9; range 13-78).

Five (2,8%) of the 176 urban subjects were HBsAg-positive while another 100 subjects (56,8%) had evidence of past HBV infection. Evidence of past HBV infection was present in 81,9% of rural subjects.[9]

When data from urban and rural subjects were viewed jointly, 4 (0,9%) of the 466 subjects with evidence of HBV infection (current and past) and 3 (2%) of the 151 with no evidence of HBV infection were anti-HCV-positive, a finding not of statistical significance.

Discussion

Compared with the high prevalence of HBV infection, HCV infection is relatively uncommon in both urban and rural areas of Natal/KwaZulu. The prevalence of HCV infection in urban (1,7%) and rural (0,9%) areas of Natal/KwaZulu is similar to the 0,7% and 0,9% reported in studies involving 25 137 French[11] and 11 117 Italian[12] blood donors, respectively. Further, the prevalence of HCV infection in Natal/KwaZulu is similar to the 0,6% reported from Ga-Rankuwa, Boputhatswana.[13]

While the small number of anti-HCV-positive subjects prevented more detailed analysis of the association between HCV and HBV infections in this survey, anti-HCV was not more common among patients with HBV infection. Our failure to demonstrate an association between HBV and HCV infections in this survey implies that HCV may not share the as yet unknown predominant risk factors responsible for the rampant spread of HBV infection[8] in these communities.

Because this was a serological survey, risk factors for HCV were not specifically investigated. Other studies have identified several risk factors for HCV infection and high prevalences of HCV infection have been documented among haemophiliacs[3] and patients on haemodialysis[10] in South Africa. Other risk groups for HCV infection have been identified on the basis of parenteral or sexual transmission, and include homosexuals, prostitutes, prisoners, institutionalised mentally retarded subjects and attenders at sexually transmitted disease clinics.[14]

Infected blood and blood products are a major transmission mechanism for HCV.[1-4] In a follow-up study of transfusion recipients, Alter *et al.*[2] demonstrated that HCV could be transmitted via infected blood and that anti-HCV remained detectable in blood for a long period after HCV infection. However, a survey in the Orange Free State did not detect anti-HCV in any one of 35 multitransfused patients,[15] a finding which may be a result of the small number of subjects studied.

Heterosexual contact is considered a risk factor for HCV since heterosexual partners of intravenous drug users have been shown to be at risk.[16] The prevalence of HCV infection among antenatal clinic attenders in Spain[16] was 1,2% and in Australia[14] 0,4%. Two small non-random samples of 100 and 25 antenatal clinic attenders from Natal[10] and the western Cape[17] respectively, did not find any anti-HCV-positive subjects.

A survey[18] comparing 216 hospitalised rural black men and 498 urban black donors found a higher, though not statistically significant, prevalence of HCV in the hospitalised patients (3,8% v. 1,2%). The trend in our study, which was also not statistically significant, was in the opposite direction (0,9% v. 1,7%). In the absence of statistical significance, the possibility that there is no difference between urban and rural blacks cannot be excluded; this makes the results of both studies difficult to interpret.

The false-positive rate on the HCV EIA was 91,4% (32/35) in the urban sample and 89,5% (34/38) in the rural sample. Heat inactivated and repeatedly frozen and thawed specimens have been found to produce false positives.[19] Although the sera we tested had been thawed once only in the case of the urban sample and twice in the case of the rural sample, the number of false positive results was high and possibly associated with the prolonged storage of the sera.[18] Confirmatory testing was therefore considered essential[1,20,21] in the determining of anti-HCV status.

In conclusion, representative community-based samples from urban and rural blacks in Natal/KwaZulu indicate that the prevalence of HCV infection in this region is low. The contrast between this and the high prevalence of HBV infection in this region suggests that HCV does not have the same main routes of transmission as HBV. Larger scale studies, in which sufficient numbers of anti-HCV-positive subjects can be recruited, are needed to explore this hypothesis.

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