PREVALENCE OF ANTIBODIES TO HEPATITIS A VIRUS (HAV)
IN BLOOD DONORS OF 13 WESTERN HEMISPHERE
COUNTRIES AND TERRITORIES

N. Nath, S. Mazzur, C. Fang, M. J. Bastiaans, J. I. Molinaris, M. Balca-

Results of a survey of 7,342 blood samples from 13 countries and territories of the Americas point to a high overall prevalence of antibodies to hepatitis A virus in these regions. The results also show a significant correlation between absence of antibodies to hepatitis A virus and absence of markers indicating hepatitis B virus infection.

Introduction

Some years ago, Feinstone et al. (1) identified a “virus-like antigen” thought to be the etiologic agent of type A hepatitis. This led to development of tests for evaluating serologic evidence of past hepatitis A virus (HAV) infection in healthy populations. Antibodies to HAV are believed widely distributed in adult populations (2); however, very little is known about the prevalence of these antibodies among the healthy adult populations of most Latin American and Caribbean countries. The results reported here are based on the testing of blood samples from donors in 13 Latin American and Caribbean countries and territories for antibodies to HAV.

Materials and Methods

Samples

A total of 7,342 blood samples were obtained from donors in Argentina, Barbados, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, Mexico, Peru, Puerto Rico, Suriname, and Venezuela in connection with the Red Cross Latin American Hepatitis B Workshop held at the University of Puerto Rico on 19-20 May 1977. Aliquots of serum in one-dram vials with 200 μg of sodium azide (NaN₃) were
shipped by air at ambient temperatures to the American Red Cross Blood Services Laboratories in Bethesda, Maryland, for testing.

**Antibodies to HAV (Anti-HAV)**

All samples were tested for the presence of anti-HAV by solid-phase radioimmunoassay, using HAVAB ® kits donated by Abbott Laboratories in North Chicago, Illinois. The test is based on the principle of competitive binding between anti-HAV in the test sample (containing 125I-labelled anti-HAV) and a HAV-coated plastic bead. Only 0.01 ml of sample was used for each test. Overnight incubation at room temperature was employed throughout the study. Results were calculated according to the manufacturer's instructions.

**Tests for Hepatitis B Virus (HBV) Markers**

As previously reported (3), the samples were also screened for hepatitis B surface antigen (HBsAg), using Ausria II ® kits (Abbott Laboratories); for antibodies to HBsAg, by means of passive hemagglutination testing; and for antibodies to hepatitis B core antigen (HBcAG), using CORAB ® (Abbott Laboratories) radioimmunoassay kits.

**Results**

As shown in Table 1, 6,856 of the samples tested (93.4 per cent) were found to have anti-HAV. The lowest prevalence of such antibodies (64.2 per cent) was found in the samples from Barbados; this prevalence was significantly lower (p \( \leq \) 0.005) than the overall prevalence from all the areas involved. In addition, Suriname (81.5 per cent) and Puerto Rico (84.3 per cent) had significantly lower prevalences of anti-HAV (p \( \leq \) 0.05). Prevalences in the other 10 countries were remarkably uniform, ranging from 94.2 per cent in Argentina to 99.8 per cent in Costa Rica and the Dominican Republic.

As Table 2 indicates, the percentage of samples without any evidence of past HBV infection18 or antibodies to HAV varied from country to country. In general, between 60

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18 Evidence of past HBV infection being detection of HBsAg. anti-HBsAg. or anti-HBcAg.

<table>
<thead>
<tr>
<th>Country or territory, listed in ascending order of anti-HAV prevalence</th>
<th>Sera tested for anti-HAV</th>
<th>Sera tested for HBV markers</th>
</tr>
</thead>
<tbody>
<tr>
<td>listed in ascending order of anti-HAV prevalence</td>
<td>No. of sera tested</td>
<td>% positive</td>
</tr>
<tr>
<td>Barbados</td>
<td>489</td>
<td>64.2</td>
</tr>
<tr>
<td>Suriname</td>
<td>486</td>
<td>81.5</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>484</td>
<td>84.3</td>
</tr>
<tr>
<td>Argentina</td>
<td>1,005</td>
<td>94.2</td>
</tr>
<tr>
<td>Venezuela</td>
<td>497</td>
<td>96.0</td>
</tr>
<tr>
<td>Peru</td>
<td>492</td>
<td>97.0</td>
</tr>
<tr>
<td>Colombia</td>
<td>484</td>
<td>97.3</td>
</tr>
<tr>
<td>Chile</td>
<td>491</td>
<td>98.0</td>
</tr>
<tr>
<td>Brazil</td>
<td>1,025</td>
<td>98.4</td>
</tr>
<tr>
<td>Mexico</td>
<td>496</td>
<td>98.4</td>
</tr>
<tr>
<td>Ecuador</td>
<td>483</td>
<td>99.4</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>444</td>
<td>99.8</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>468</td>
<td>99.8</td>
</tr>
<tr>
<td>Total</td>
<td>7,342</td>
<td>93.4</td>
</tr>
</tbody>
</table>
Table 2. Relationship between absence of antibody to HAV and absence of HBV markers in sera from 13 countries and territories of the Americas.

<table>
<thead>
<tr>
<th>Country or territory</th>
<th>No. of sera tested</th>
<th>No. negative for anti-HAV</th>
<th>No. negative for both anti-HAV and HBV markers</th>
<th>% of anti-HAV-negative sera also negative for HBV markers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbados</td>
<td>489</td>
<td>175</td>
<td>158</td>
<td>90.3</td>
</tr>
<tr>
<td>Suriname</td>
<td>486</td>
<td>90</td>
<td>62</td>
<td>68.9</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>484</td>
<td>76</td>
<td>72</td>
<td>94.7</td>
</tr>
<tr>
<td>Argentina</td>
<td>1,005</td>
<td>58</td>
<td>50</td>
<td>88.2</td>
</tr>
<tr>
<td>Venezuela</td>
<td>497</td>
<td>20</td>
<td>17</td>
<td>85.0</td>
</tr>
<tr>
<td>Peru</td>
<td>492</td>
<td>15</td>
<td>10</td>
<td>66.7</td>
</tr>
<tr>
<td>Colombia</td>
<td>484</td>
<td>15</td>
<td>9</td>
<td>69.2</td>
</tr>
<tr>
<td>Chile</td>
<td>491</td>
<td>10</td>
<td>7</td>
<td>70.0</td>
</tr>
<tr>
<td>Mexico</td>
<td>496</td>
<td>8</td>
<td>7</td>
<td>87.5</td>
</tr>
<tr>
<td>Brazil</td>
<td>1,025</td>
<td>16</td>
<td>13</td>
<td>81.5</td>
</tr>
<tr>
<td>Ecuador</td>
<td>485</td>
<td>3</td>
<td>3</td>
<td>100.0</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>444</td>
<td>1</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>468</td>
<td>1</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>7,342</td>
<td>486</td>
<td>408</td>
<td>84.0</td>
</tr>
</tbody>
</table>

and 90 per cent of the samples without anti-HAV yielded no evidence of HBV infection.

Of the 6,856 samples with anti-HAV, 1,868 (27.2 per cent) also had HBV markers, while only 78 (16 per cent) of the 486 samples lacking anti-HAV were positive for HBV markers (see Table 3). Thus a sample negative for anti-HAV had a significantly greater chance ($\leq 0.005$) of also being negative for HBV markers.

Table 3. Overall relationship between sera with and without anti-HAV and sera with and without HBV markers.

<table>
<thead>
<tr>
<th>Antibody to HAV</th>
<th>No. of sera tested</th>
<th>Sera with one or more HBV markers</th>
<th>Sera with no detected HBV markers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>6,856</td>
<td>1,868</td>
<td>4,988</td>
</tr>
<tr>
<td>Absent</td>
<td>486</td>
<td>78</td>
<td>408</td>
</tr>
<tr>
<td>Total</td>
<td>7,342</td>
<td>1,946</td>
<td>5,396</td>
</tr>
</tbody>
</table>

$X^2 = 29.21; p \leq 0.005$.

Discussion

The data presented here indicate that most of the adult population of Latin America and the Caribbean has antibodies to HAV. On the basis of available information, we cannot explain the significantly lower prevalences of anti-HAV found in sera from Barbados, Suriname, and Puerto Rico—as compared to sera from the other countries involved. However, the almost universal (93.4 per cent) overall presence of anti-HAV found by the survey agrees with the findings of Villarejos et al. (4), who studied a population in Costa Rica. Szmuness et al. (2), studying volunteer blood donors from various countries around the world, found the prevalence of anti-HAV to vary from a low of 25.8 per cent in Switzerland to a high of 97 per cent in Yugoslavia. In the United States, 40.7 per cent of the blood donors tested by Szmuness et al. (5) had anti-HAV, the prevalence varying with socioeconomic status.

In addition, our results showed a significant association ($p \leq 0.005$) between absence of anti-HAV and absence of HBV markers (3), suggesting that a sample found negative for anti-HAV was also likely to be negative for HBV markers. The very high prevalence of anti-HAV in the samples studied (93.4 per cent) precluded analysis for a meaningful association between presence of anti-HAV and presence of HBV markers, so this analysis was not attempted. A positive association between
presence of anti-HAV and presence of HBV markers has been reported in mentally re- 
tarded children (6, 7). The differences noted 
in this study may reflect the differences in the 
blood donor populations studied.

The data presented here show for the first 
time the extent of hepatitis A infection in 
many countries of the Americas. We believe 
that this information will be of practical value 
in designing futures studies.

ACKNOWLEDGMENT

We are grateful to Abbott Laboratories of 
North Chicago, Illinois, for their generous gift 
of HAVAB ® kits.

SUMMARY

A total of 7,342 blood samples from donors in 13 
Western Hemisphere countries and territories 
(Argentina, Barbados, Brazil, Chile, Colombia, 
Costa Rica, the Dominican Republic, Ecuador, 
Mexico, Peru, Puerto Rico, Suriname, and Vene-
zuela) were tested 
for the presence of antibodies to 
hepatitis A virus (anti-HAV) by solid-phase radio-
immunoassay. The prevalence of anti-HAV varied 
from a low of 64.2 per cent in the Barbados sera to 
a high of 99.8 per cent in sera from Costa Rica and 
the Dominican Republic. A significant number of 
samples that lacked anti-HAV also failed to show 
any evidence of past or present hepatitis B infec-
tion.

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