

## PREVALENCE OF ANTIBODIES TO HEPATITIS A VIRUS (HAV) IN BLOOD DONORS OF 13 WESTERN HEMISPHERE COUNTRIES AND TERRITORIES<sup>1</sup>

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*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  $\mu$ g of sodium azide (NaN<sub>3</sub>) were

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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 <sup>125</sup>I-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 infection<sup>18</sup> or antibodies to HAV varied from country to country. In general, between 60

<sup>18</sup>Evidence of past HBV infection being detection of HBsAg, anti-HBsAg, or anti-HBcAg.

**Table 1. Comparison of the prevalence of anti-HAV and the prevalence of HBV markers in sera from 13 countries and territories of the Americas.**

Country or territory, listed in ascending order of anti-HAV prevalence	Sera tested for anti-HAV		Sera tested for HBV markers
	No. of sera tested	% positive	% positive for one or more markers
Barbados	489	64.2	13.1
Suriname	486	81.5	40.9
Puerto Rico	484	84.3	11.1
Argentina	1,005	94.2	18.6
Venezuela	497	96.0	17.9
Peru	492	97.0	27.3
Colombia	484	97.3	29.3
Chile	491	98.0	6.7
Brazil	1,023	98.4	33.9
Mexico	496	98.4	
Ecuador	483	99.4	35.3
Costa Rica	444	99.8	20.6
Dominican Republic	468	99.8	82.8
Total	7,342	93.4	

Table 2. Relationship between absence of antibody to HAV and absence of HBV markers in sera from 13 countries and territories of the Americas.

Country or territory	No. of sera tested	No. negative for anti-HAV	No. negative for both anti-HAV and HBV markers	% of anti-HAV-negative sera also negative for HBV markers
Barbados	489	175	158	90.3
Suriname	486	90	62	68.9
Puerto Rico	484	76	72	94.7
Argentina	1,005	58	50	86.2
Venezuela	497	20	17	85.0
Peru	492	15	10	66.7
Colombia	484	13	9	69.2
Chile	491	10	7	70.0
Mexico	496	8	7	87.5
Brazil	1,023	16	13	81.3
Ecuador	483	3	3	100.0
Costa Rica	444	1	0	0.0
Dominican Republic	468	1	0	0.0
Total	7,342	486	408	84.0

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.

Antibody to HAV	No. of sera tested	Sera with one or more HBV markers	Sera with no detected HBV markers
Present	6,856	1,868	4,988
Absent	486	78	408
Total	7,342	1,946	5,396

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

## 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 23.8 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 socio-economic 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 retarded 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.

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### 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 Venezuela) 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 infection.

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