

Prevalence of Chronic Hepatitis B and C Virus Infection in Kami-Goto-Town, Nagasaki Prefecture, Japan.

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Annual mass examinations in an area where the mortality rate due to liver disease is very high in Nagasaki Prefecture, Japan, have been done between 1984 and 1992 in order to evaluate the prevalence of chronic hepatitis B and C virus infection. The positivity rate for hepatitis B surface antigen (HBsAg) was 4.2%, whereas the positivity rate for anti-hepatitis C virus antibody (anti-HCV) was 9.5% as a whole and 7.2% with exclusion of the anti-HCV-positive inhabitants receiving blood transfusion. When the positivity rates for these markers were analyzed by year of birth, the positivity rate for HBsAg reached a peak (8.4%) in inhabitants born during 1941-45, and thereafter decreased. The positivity rates for anti-HCV, even when the anti-HCV-positive inhabitants receiving blood transfusion were excluded, were more than 7% in inhabitants born in 1935 and before, and thereafter followed by a decreasing trend as evidenced by the fact that none of inhabitants born in 1951 and after was anti-HCV-positive.

These results suggest that the positivity rates for both of HBsAg and anti-HCV in inhabitants born in 1946 and after steadily decrease in Kami-Goto-town, where the positivity rates for these markers are, at present, very high.

Introduction

Liver cirrhosis is common in Nagasaki Prefecture, Japan, where the mortality rate due to liver disorders is especially high in Kami-Goto-town in the Goto Islands.¹⁾ Previous epidemiological studies demonstrated that chronic hepatitis B virus (HBV) infections were common in the Goto Islands, and they were closely related to liver cirrhosis and hepatocellular carcinoma.^{2,3,4)} In Japan, the HBV carrier rate currently decreased, but the incidence of liver cirrhosis and hepatocellular carcinoma steadily increased in the last 10 years.⁵⁾

The recent cloning of the hepatitis C virus (HCV) genome and the availability of specific assays allowed to study the prevalence of HCV infection in patients with chronic liver diseases^{6,7)} and showed that more than 70% of hepatitis B surface antigen (HBsAg)-negative patients with chronic hepatitis or liver cirrhosis were associated with chronic HCV infection in Japan.⁸⁾

In the present study, the prevalence of chronic HBV and HCV infection was analyzed in inhabitants in Kami-Goto-town, Nagasaki Prefecture, Japan.

Methods

Kami-Goto-town is in the north area of Goto Islands (Fig. 1). Most of the 9,000 inhabitants are engaged in fishing or agriculture. From death certificates, the mortality rate due to liver disease, especially hepatocellular carcinoma, is approximately 30 per 100,000 population in the last 10 years.¹⁾ Between 1984 and 1992, annual mass examinations in inhabitants aged 40 years old or more in men and 30 years old or more in women have been done in this area. During the period, 2061 inhabitants were tested for HBsAg; 652 were men and 1409 were women. In addition, 1325 inhabitants who received annual mass examinations during 1991-92 were also tested for anti-HCV antibody (anti-HCV). There were 360 men and 965 women aged 40 to 81 and 30 to 84 years old, respectively.

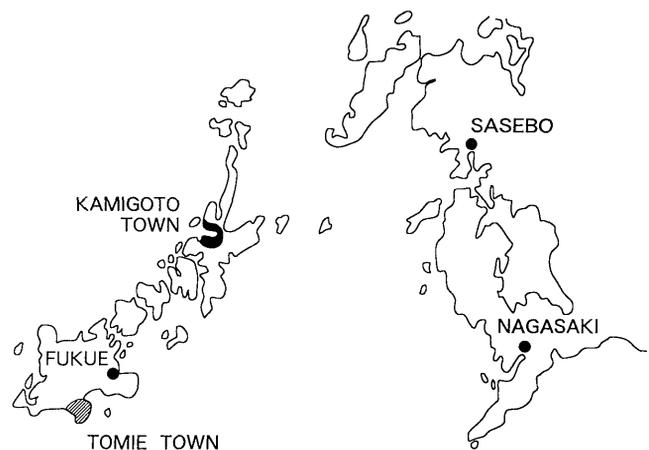


Fig. 1. Location of Kami-Goto-town

HBsAg was measured by reverse passive hemagglutination method and anti-HCV (2nd generation) by enzyme-linked immunosorbent assay using a commercially available kit (Chiron Co, California, USA).

Statistical analyses were carried out using the chi-square test. P values < 0.05 were considered statistically significant.

Results

HBsAg carrier rates

Among 2061 inhabitants, 86 (4.2%) were positive for HBsAg (Table 1). The positivity rates for HBsAg in men and women were 4.6% and 4.0%, respectively. The difference was not significant ($P > 0.5$). When the HBsAg carrier rates were analyzed by year of birth, the rate reached a peak (8.4%) in inhabitants born during 1941-45, and thereafter decreased to 3.8% in inhabitants born during 1956-60 (Fig. 1).

Table 1. The Positivity Rate for HBsAg in Inhabitants

	Inhabitants tested (n = 2061)	
	HBsAg (+)	HBsAg (-)
No. of inhabitants	86	1975
Sex ratio (M/F)	30/56	622/1353
Age (years old)	41-82	30-88

Anti-HCV positivity rates

Of 1325 inhabitants tested for anti-HCV, 122 (9.2%) were anti-HCV-positive (Table 2). The positivity rate for anti-HCV in men was slightly higher than that in women (12.2% vs. 8.1%, $P < 0.05$). Among the 122 anti-HCV-positive inhabitants, 29 (23.8%) received blood transfusion 7 to 42 years before examination; seven were men and 22 were women. Thus, the positivity rate for anti-HCV was 7.2% when these 29 inhabitants receiving blood transfusion were excluded. To study changes in the prevalence of HCV infection which was not caused by blood transfusion, the positivity rate for anti-HCV in inhabitants was analyzed by year of birth with exclusion of those who were anti-HCV-positive after receiving blood transfusion (Fig. 2). The positivity rates for anti-HCV in inhabitants born in 1935 and before were more than 7%; in contrast, the positivity rates in inhabitants born during 1936-50 ranged from 3 to 5%, and none of inhabitants born in 1951 and after was anti-HCV-positive.

Table 2. The Positivity Rate for Anti-HCV in Inhabitants

	Inhabitants tested (n = 1325)	
	anti-HCV (+)	anti-HCV (-)
No. of inhabitants	122	1203
Sex ratio (M/F)	44/78	316/887
Age (years old)	42-81	30-88
Positive history of blood transfusion (m/F)	29 (7/22)	32 (8/24)

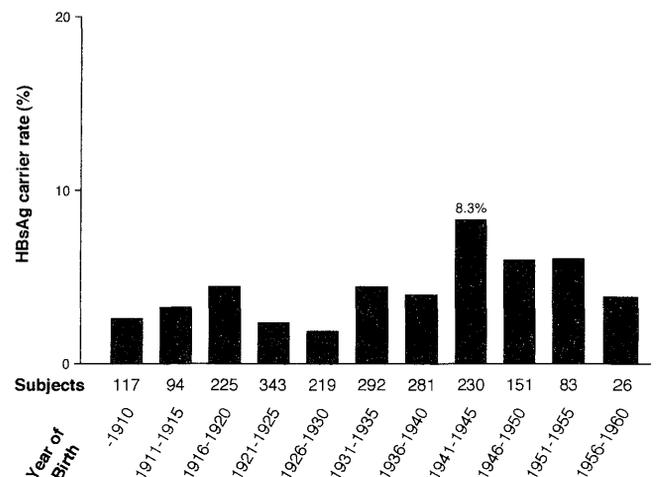


Fig. 2. HBsAg Carrier Rate by Year of Birth

The number of subjects tested for HBsAg is indicated below the horizontal line.

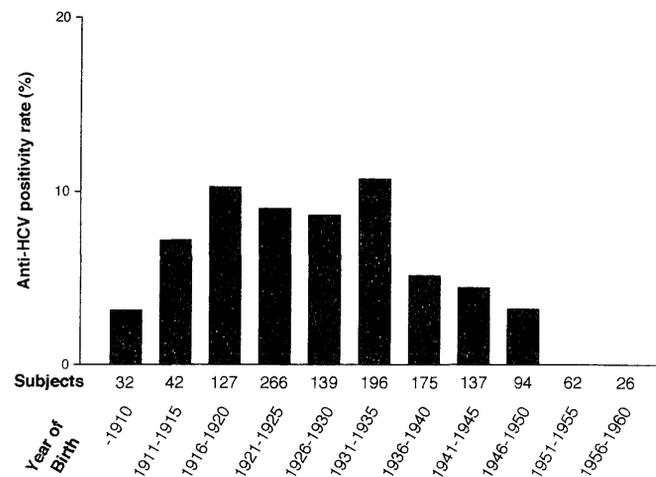


Fig. 3. Anti-HCV Positivity Rate by Year of Birth

The number of subjects tested for anti-HCV excluding anti-HCV-positive inhabitants receiving blood transfusion is indicated below the horizontal line.

Discussion

In the present study, the HBV carrier rate was higher in Kami-Goto-town than in other areas in Japan;⁹ however, the HBV carrier rate reached a peak in inhabitants born during 1941-45, and thereafter decreased. Similar results were reported by Matsuo¹⁰ who demonstrated that the prevalence of the HBV carriers in Tomie-town in the Goto Islands reached a peak during 1940s and thereafter decreased. It remains unclear why the HBV carrier rate relatively decreased in inhabitants born in 1946 and after in Kami-Goto-town, but the reduction in occurrence of horizontal transmission of HBV in infancy possibly plays a major role as previously reported in Tomie-town.¹⁰

The positivity rate for anti-HCV in Kami-Goto-town was 7.2%, even when the anti-HCV-positive inhabitants receiving blood transfusion were excluded. Since Nishioka⁹ demonstrated that the positivity rate for anti-HCV using 1st generation anti-HCV kit in Japanese blood donors was 1.15%, Kami-Goto-town-seemed to be a very prevalent area for HCV infection. When the age distribution of the anti-HCV-positive inhabitants were analyzed by year of birth, more than 7% of inhabitants born in 1935 and before but none of inhabitants born in 1951 and after were anti-HCV-positive. These results indicate that the positivity rate for anti-HCV in this area is, at present, very high, but will be reduced with the advance of years. The number of patients with HCV-associated hepatocellular carcinoma was found to increase in the last 6 years in Nagasaki Prefecture.¹¹ However, it is possible that the incidence of HCV-associated hepatocellular carcinoma will decrease in near future, if the positivity rate for anti-HCV in inhabitants born in 1950s and after in Nagasaki Prefecture is as low as that in Kami-Goto-town.

The mode of HCV transmission is still unknown. Blood transfusion is one of the factors in HCV transmission;^{5, 12, 13} however, only 23.8% of the anti-HCV-positive inhabitants received blood transfusion in this study. Although several groups indicated familial clustering of HCV infection,^{14, 15} it is unlikely because none of inhabitants born in 1951 and after from anti-HCV-positive parents were anti-HCV positive.

In summary, this study shows the decreased positivity rates for both of HBsAg and anti-HCV in inhabitants born in 1950s and after in Kami-Goto-town, Nagasaki Prefecture, Japan.

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