Seroprevalence of *Helicobacter pylori* in New York City Populations Originating in East Asia

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ABSTRACT *Helicobacter pylori* prevalence is higher in developing countries than in industrialized countries, and within the latter, higher among immigrants than among native-born residents. Using a point-prevalence survey, we sought to identify risk factors for *H. pylori* seropositivity in US urban East Asian-born populations. At a clinic in New York City, we consecutively enrolled 194 East Asian-born adults, who then responded to a survey and provided a blood sample. Assays were performed to detect IgG antibodies against whole cell (WC) and cytotoxin associated gene A (CagA) antigens of *H. pylori*. For this group (mean age 50.2 ± 14.7 years), the mean period of residence in the United States was 11.9 ± 7.7 years. The total *H. pylori* seroprevalence was 70.1%, with highest (81.4%) in Fujianese immigrants. Multiple logistic regression analysis indicated an independent association of *H. pylori* seropositivity with Fujianese origin [odds ratios (OR) = 2.3, 95% confidence interval (95% CI) = 1.05–5.0] and inverse associations with period in the United States (OR per year of residency in the United States = 0.95, 95% CI = 0.91–0.99) and with a history of dyspepsia (OR for a history of stomach pain = 0.52, 95% CI = 0.3–1.0). We conclude that *H. pylori* is highly prevalent among recent East Asian immigrants, especially among Fujianese. The protective effects of history of dyspepsia and duration in the United States suggest that these may be markers for antibiotic therapies.

KEYWORDS *H. pylori*, Seroprevalence, Immigrants, East Asian, Epidemiology.

INTRODUCTION

The prevalence of *Helicobacter pylori* in developed countries varies by socioeconomic status, ethnicity, and age.^{1–4} In developing countries, the prevalence of *H. pylori* in adults is much higher, varying less, and less dependent on age and socioeconomic status.^{5,6} Not surprisingly, the prevalence of *H. pylori* is higher among immigrants to developed countries compared with native-born residents.^{7,8}

Immigration to the United States has been occurring at the highest rate since World War II,⁹ with most immigrants from developing countries where *H. pylori* is highly prevalent in young adult populations.⁶ Although there are variations in

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H. pylori prevalence among persons from different countries in Asia,^{10,11} the prevalence of *H. pylori* in Asian communities living in Western countries has not been characterized.

New York City has received substantial numbers of Asian immigrants for the past 50 years. The Chinese population of Manhattan's Chinatown represents the largest concentration of persons of Chinese origin in the Western hemisphere, and there are approximately 500,000 Chinese-Americans in the New York metropolitan area, comprising about 5% of the total population;¹² however, we know little about *H. pylori* prevalence in this population.

The goal of this study was to perform a preliminary survey of *H. pylori* seroprevalence in East Asian-born populations living in New York City, with particular emphasis on the Chinese community, and to identify risk factors associated with *H. pylori* status.

MATERIALS AND METHODS

Study Population

We enrolled 194 consecutive East Asian-born adults undergoing routine medical screening at the Medical and Vaccination Clinics at the NYU Downtown Hospital in Manhattan, New York in May and June 2002. The group had a mean age of 50.2 years (median=51.5 years, range=20–90 years), and 61.9% were female. The mean ($\pm$ standard deviation) number of years spent in the United States was 11.9 ± 7.8 .

After the patients signed the consent form, each individual responded to a short survey to identify potential risk factors³ associated with *H. pylori* prevalence that included subject age, gender, place of birth, number of years in the United States, number of siblings they had, birth order, presence of running water in the household during childhood, history of hospitalizations, smoking and drinking habits, and abdominal symptoms experienced in the prior month. The survey and the consent forms were available in English and Chinese. Participants were free to select whichever language they were most comfortable with. Clinic staff administered the brief interview verbally to illiterate participants in Cantonese, Fujianese, or Mandarin Chinese.

Serologic Methods

Each subject provided a blood sample, and we performed enzyme-linked immunoadsorbent assay (ELISA) tests to determine levels of IgG-specific antibodies against whole cell (WC) and cytotoxin associated gene A (CagA) antigens of *H. pylori*, using methods previously described.^{13–15} Each sample was run at least in duplicate by laboratory personnel blinded to each subject's status. Because *H. pylori* culture-positive individuals can be seronegative in the *H. pylori* assay, but positive in the CagA assay,¹⁶ in this study, *H. pylori* positivity was defined by seropositivity in the *H. pylori* or CagA assays.

Statistical Methods

Differences in prevalence between each group were analyzed using the chi-square test with Yates' correction for continuity and Mantel's test for trend.¹⁷ A *P* value $<.05$ was accepted as statistically significant. Multiple logistic regression analysis was used to investigate the independence of risk factors and possible interactions. Statistical analyses used SPSS, EGRET, and R, as appropriate.^{18,19}

RESULTS

Prevalence of *H. pylori* Based on Place of Birth

The *H. pylori* seroprevalence in this study population was 70.1%. Of those positive, 82.4% had *cagA*+, and 17.6% had *cagA*– strains. In total, 13.9% were positive for CagA only, similar to results from central Asia, in which seropositivity only in the CagA assay was confirmed by culture positivity.¹⁶ The highest *H. pylori* seroprevalence (81.4%) was found among Asian–Americans born in Fujian province (Table 1). In contrast, Chinese immigrants from northern China or from Guangdong province had significantly lower *H. pylori* prevalence (59.4% and 63.4%, respectively; *P* = .03). *H. pylori* prevalence among persons born in southeast Asian countries (74.2%) did not differ significantly from that observed in Chinese populations. In each of the populations, the proportion of subjects with *cagA*– *H. pylori* strains was relatively constant.

Analysis of Potential Factors Associated with *H. pylori* Seroprevalence

We next investigated whether *H. pylori* seroprevalence was associated with recent GI symptoms, family history of gastric cancer or peptic ulcer disease (PUD), and running water in the home during childhood. There were no significant correlations between *H. pylori* seroprevalence and any of the factors analyzed (Table 2). Subjects

TABLE 1. Prevalence of *Helicobacter pylori* based on place of birth in 194 East Asian–Americans in New York

Population				Distribution of patients by location (%)			
Status		Number of subjects	Percent of total	Fujian (n = 7)	Guangdong (n = 77)	North China (n = 29)	Other (n = 31)
<i>H. pylori</i>	CagA						
–	–	57	29.4	18.6*	36.4	41.4	25.8
+	–	19	9.8	10.5	7.8	10.3	12.9
–	+	27	13.9	14.0	16.9	6.9	3.2
+	+	89	45.9	56.1	40.2	37.9	48.4

**P* = .03 compared with Guangdong and North China.

TABLE 2. Age, GI symptoms, and other factors associated with *Helicobacter pylori* prevalence in an East Asian–American population

Population				Percent			
Status		Number of subjects	Mean age (years)	Family history			
<i>H. pylori</i>	CagA			Abdominal pain*	CA†	Peptic ulcer disease	Running water‡
–	–	58	51.9 ± 14.8	51.7	22.4	22.4	29.8
–	+	27	48.6 ± 16.6	40.7	14.8	18.5	29.6
+	–	19	48.3 ± 15.2	26.3	36.8	10.5	52.6
+	+	89	50.0 ± 14.1	40.4	22.5	20.2	28.1

*Dyspepsia symptoms.

†Gastric cancer.

‡Availability of running water in the household during childhood.

who had previously spent any time in a hospital were less likely to be *H. pylori* positive (62.8%) than persons who never had been hospitalized (75.8%, $P=.05$).

Factors such as subject gender, hepatitis status, number of children in household, smoking, and alcohol use also were investigated to determine their influence on *H. pylori* seroprevalence; none of these factors were associated with *H. pylori* seroprevalence (data not shown). One factor that was inversely associated with *H. pylori* seroprevalence was the number of years that East Asian immigrants had spent in the United States (Table 3 P value from Mantel's test for trend = .008). When years spent in the United States was entered into logistic regression analysis as a quantitative rather than a categorical variable, the association increased in statistical significance ($P<.001$), without loss of goodness of fit (as assessed by the le Cessie-van Houwelingen-Copas-Hosmer unweighted sum of squares test^{20,21} as well as by entering both categorical and continuous variables).

Multiple Logistic Regression Analysis of Risk Factors for *H. pylori* Seroprevalence

Multiple logistic regression analysis was performed to construct a multivariable model of *H. pylori* seroprevalence in the study population. In this model, *H. pylori* seropositivity was associated with birth in Fujian province [odds ratios (OR)=2.3, 95% confidence interval (95% CI)=1.05–5.0] and inversely with recency of immigration to the United States (odds ratio per year of residency in the United States=0.95, 95% CI=0.91–0.99) and with a history of abdominal pain (odds ratio for a history of abdominal pain=0.52, 95% CI=0.3–1.0).

DISCUSSION

The seroprevalence of *H. pylori* differs greatly between developed and developing countries.²² Thus, in developed countries such as the United States, this difference represents an important disparity between native and immigrant populations.^{6,23} Such disparities tend to affect major urban centers such as New York, in which the impact of immigration is disproportionately higher than in other parts of the United States. Given the high seroprevalence of *H. pylori* among adults in East Asian countries, it was not surprising that this study found that more than 70% of the adult

TABLE 3. Association of *Helicobacter pylori* status and number of years of residence in the United States for 193 East Asian-Americans

Number of years residing in the United States	Number of subjects*		Odds ratio (95% confidence interval)§
	Screened	<i>H. pylori</i> positive (%)†	
1–4	34	27 (79.4)	1.00 (0.27–2.77)‡
5–9	52	40 (76.9)	0.86 (0.20–2.04)
10–14	45	32 (71.1)	0.64 (0.13–1.80)
15–19	26	17 (65.4)	0.49 (0.09–0.93)
≥20	36	19 (52.8)	0.29
Total	193	135 (69.9)	—

*For one of the original 194 subjects, the numbers of years since migration was unknown.

†*H. pylori* status was defined as either positive for *H. pylori* whole cell (WC) or CagA.

‡Reference group.

§ $P=.008$, Mantel's test for trend.

immigrants examined were *H. pylori* positive. The seroprevalence was higher than that previously reported in other New York City populations of asymptomatic individuals (<20% seroprevalence),²⁴ symptomatic patients with different ethnic backgrounds (43% in African American, 20% in Hispanic, and 11% in Caucasian),²⁵ or even among Caucasian patients with upper gastrointestinal (GI) symptoms that we observed at the VA Medical Center in Manhattan (64%).²⁶

Birthplace has previously been reported to be a risk factor for presence of *H. pylori* in immigrant communities in developed countries,²⁷ and our data are consistent with this observation. Among immigrants of Chinese origin, those born in Fujian province had a significantly higher *H. pylori* seroprevalence than those born in Guangdong province or in provinces of northern parts of China.

Many of the risk factors previously reported for *H. pylori* acquisition⁵ did not show any significant association with *H. pylori* seropositivity in our study, but the number of subjects in our study groups was relatively small. The presence of GI complaints was not significantly associated with *H. pylori* status in the univariate analysis but in a multivariable model adjusted for origin in Fujian province, and the number of years spent in the United States was inversely associated. The apparent "protective effect" of a history of stomach pain suggests that such pain may be a proxy for *H. pylori* treatment or possibly for antimicrobial treatment for GI or other complaints, or it is a marker of other conditions that make *H. pylori* acquisition less likely. *H. pylori* seroprevalence was negatively associated with a history of hospitalization, but this association was not significant in multiple logistic regression after the entry of other, more highly correlated, variables (data not shown). Nevertheless, the direction is consistent with a "protective effect" associated with contact with medical practitioners.

When we analyzed other factors previously reported to be associated with *H. pylori* seroprevalence, there was no relation with indoor plumbing during childhood, and in contrast to Goodman *et al.*,^{3,28} no correlation with crowding index, birth order, or number of children living in the same household. These differences could reflect differences in the populations studied, our small sample size, or the heterogeneity of the studied population. The strongest predictor of *H. pylori* positivity was the number of years of residence in the United States, remaining significant even after adjustment for emigration from Fujian province. A parallel observation has been reported in New York in symptomatic patients seeking medical attention at inner-city hospitals.²⁵ We speculate that these associations as well as the negative association with hospitalization and with history of abdominal pain might be explained by increased exposure to antibiotics. Even monotherapies with amoxycillin²⁹ or clarithromycin,³⁰ for example, remove *H. pylori* in 10% to 50% of treated subjects. This hypothesis will need to be directly tested.

Our study reflects the waves of immigrants from China to New York City. Although previous waves of Chinese immigrants predominantly have come from Guangdong, a province in southern China including Guangzhou (Canton), the most recent Chinese immigrants have been from rural Fujian. The Fujianese have mainly settled in the New York metropolitan area.³¹ This change in the pattern of migration is important given that Fujian has one of the world's highest mortality rates associated with distal gastric cancer.³² Although the exact number of Fujianese living in New York City is unknown, as many as 100,000 Fujianese were estimated to be living in New York City in 1994, with an additional 10,000 entering each year.³¹ Consequently, and as supported by this study, New York City health institutions should establish early detection programs for gastric cancer as a preventive measure in the Fujianese population.

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