

Seroprevalence of *Helicobacter pylori* Infection in Couples

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We investigated the prevalence of *Helicobacter pylori* in 277 couples attending an infertility clinic. In total, 96 (17.3%) of the 554 persons were positive; in only 18 (6.6%) of the couples were both persons seropositive. Age was an important predictor for *H. pylori* infection. For 177 couples, information regarding birthplace, duration of cohabitation, history of ulcer or gastritis, and use of antacid or bismuth compounds was available. None of these variables correlated with *H. pylori* infection except place of birth; 69.1% of 55 persons born outside the United States were seropositive compared with 8.7% of persons born within the United States ($P < 0.0001$). Being a partner of an *H. pylori*-infected person increased the risk of being infected; however, by multiple logistic regression analysis this effect was entirely explained by age and national origin. These data suggest that in young sexually active adults, person-to-person transmission of *H. pylori* does not occur or at most occurs infrequently.

There is increasing evidence that *Helicobacter* (formerly *Campylobacter*) *pylori* is an important pathogen of humans, as its presence is related to both gastritis and peptic ulcer disease (3, 5, 12, 15). No extrahuman reservoir for *H. pylori* has been described (2), and considering its prevalence among humans around the world (5, 7, 13, 17), humans represent a large or possibly the entire reservoir for the organism. That person-to-person transmission might occur is supported by studies indicating higher than expected prevalence in institutions for the mentally retarded (1) and for orphans (17), in developing rather than developed countries (13, 17), and by a study using intrafamilial clustering (6).

How *H. pylori* might pass from the stomach of one person to another is not evident. The organism has not been isolated from feces (14), but it has been isolated from dental plaque from persons with periodontal disease (10). However, studies of both homosexual and heterosexual men attending a clinic for persons with sexually transmitted diseases do not show an increased risk for *H. pylori* infection as numbers of sexual partners increase (18). To gain further information on the possibility of sexual transmission, we have now studied sexually active couples attending an infertility clinic.

We examined serum samples from a total of 554 persons representing 277 couples attending a New York infertility clinic. We had no information regarding whether or not the persons studied had previously undergone gastroduodenoscopy. For all persons, information about age and gender was available, and for 177 couples, information regarding birthplace, duration of cohabitation, history of ulcer or gastritis, and the use of antacid or bismuth compounds was also available. For 100 couples, information on the presence or absence of serum antisperm antibodies was available. All sera had been stored at -20°C for 3 to 6 months. Sera were examined for *H. pylori*-specific antibodies by an immunoglobulin G enzyme-linked immunosorbent assay, as previously described (16). In brief, a pooled sonicated whole-cell

antigen from five *H. pylori* strains was used. The assay has a sensitivity and specificity of $>95\%$ (5, 6, 16). The screening serum dilution was 1:800, and the threshold for positivity was established as previously described (6). The result for each serum sample is expressed as the ratio of the optical density value of the sample to the calculated threshold for that day's run. Samples were run in duplicate on at least two different occasions. Samples with a ratio higher than 1.0 were considered positive in that assay.

For univariate analysis, the chi-square test and Student's *t* test for independent variables were used to evaluate the significance of different rates of seropositivity among subgroups of the population studied. Stepwise multiple logistic regression analysis used the LR module of the BMDP statistical package (BMDP Statistical Software, Los Angeles, Calif.).

The patients studied were mostly Caucasian young adults who had lived together an average of 7 years (Table 1). In total, 96 (17.3%) persons studied were seropositive; in only 18 (6.6%) of the 277 couples were both partners seropositive. The prevalence of *H. pylori*-specific antibody was similar in men and women despite the age differences observed (Table 2). The prevalence of *H. pylori* antibodies increased the age, as expected. Persons born outside the United States had a significantly higher prevalence of *H. pylori* antibodies than persons born in the United States (Table 2). Infection rates for those born in Europe (mostly southern and eastern Europe) or in the developing countries of Asia, Africa, and Latin America were similarly high. The presence of anti-sperm antibody, a diagnosis of gastritis or ulcer, and the use of antiulcer medications or bismuth salt were not associated with risk of *H. pylori* infection. Being the partner of an *H. pylori*-infected person increased the risk of *H. pylori* infection (odds ratio = 3.92; 95% confidence interval, 2.01 to 7.65; $P = 0.001$). Neither age nor duration of cohabitation was associated with risk of infection occurring in both partners. However, in 12 of 13 couples who were both positive and for whom information was available, at least one member was born outside of the United States. To control for potential confounding factors, risk factors for *H. pylori* infection were evaluated by using a logistic multiple

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TABLE 1. Demographic features of infertility clinic patients

Patients	Age (yr) (n = 547)		Duration (yr) of cohabitation (n = 354)		% Born in United States (n = 354)	% Caucasian (n = 354)	% with history of ulcer (n = 354)	% with history of gastritis (n = 354)	% who had used antacids or bismuth compounds (n = 354)	% with antisperm antibodies (n = 200)
	Range	Mean ± SEM	Range	Mean ± SEM						
Male	23-69	37.1 ± 0.38			82.5	84.8	5.6	9.0	23.2	41.0
Female	22-52	34.9 ± 0.30			86.4	88.7	5.6	9.6	24.3	47.0
Total	22-69	36.0 ± 0.25	1-20	7.0 ± 0.3	84.5	86.7	5.6	9.3	23.7	44.0

regression analysis model. When the independent variables included in the regression were restricted to age, gender, and infection status of spouse, status of spouse and age but not gender were significantly associated with infection status of subject. However, when the regression model also included place of birth and duration of cohabitation, place of birth and age were the only variables significantly associated with infection status ($P < 0.001$); neither status of spouse nor duration of cohabitation was associated with infection status. In accord with previous studies (5, 9, 13, 16), in this group of adults, the prevalence of *H. pylori* infection was related to age but not to gender. The lack of correlation between seropositivity and the history of gastritis or ulcer in this population may be explained by the lack of accuracy in the diagnosis. A new finding, suggested by earlier work (4, 8), is that birth outside the United States is a risk factor for infection, but we did not find any correlation of *H. pylori* infection with any specific national origin.

The critical question we sought to address is whether sexual cohabitation with an *H. pylori*-infected person was a risk factor for acquisition of infection, which might imply specific routes for transmission. Controlling for age and national origin, there was no indication that cohabitation was a risk factor for *H. pylori* infection. However, there may be a risk of acquiring infection from an infected partner that is sufficiently low that we could not detect it within the 2,390 person-years of cohabitation in this investigation. If our results are interpreted as identifying zero cases of transmission, then by the Poisson distribution the upper 95% confidence interval for transmission would be three cases in 2,390 person-years, or one per 797 person-years. A larger study could further refine this upper limit. Nevertheless, our

results are consistent with other studies that suggest that sexual transmission is not a predominant route for *H. pylori* infection (11, 18).

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TABLE 2. Seroprevalence of *H. pylori* infection in relation to gender, age, and national origin^a

Characteristic	n	Optical density (mean ± SEM) of serum sample	% Positive
Gender			
Female	277	0.77 ± 0.07	15.9
Male	277	0.62 ± 0.05	18.8
Age group (yr)			
20-29	62	0.50 ± 0.08	12.9
30-39	349	0.62 ± 0.05	14.6
≥40	136	0.99 ± 0.12	27.2
Place of birth			
United States	299	0.51 ± 0.05*	8.7†
Outside United States	55	2.02 ± 0.22*	69.1†

^a *, $P < 0.0001$ (Student's *t* test for independent variables); †, $P = 0.0003$ (χ^2 test).

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