LOW PREVALENCE OF *HELICOBACTER PYLORI* INFECTION EVALUATED BY STOOL ANTIGEN TEST IN PRESCHOOL AND SCHOOL CHILDREN

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ABSTRACT

The study evaluated the prevalence of *Helicobacter pylori* infection in toddlers using the stool antigen test. *Helicobacter pylori* was detected in 28/113 (13.1%). Crowding and age were risk factors significantly associated to the infection. We conclude there is a low prevalence of the infection in the studied children.

Key words: Helicobacter, school health, occupational risks

Helicobacter pylori gastritis is a major risk factor for intestinal-type gastric adenocarcinoma, mucosa-associated lymphoid tissue lymphoma, gastric ulcer and duodenal ulcer (7). Furthermore, *Helicobacter pylori* infection has been associated recently with ferropenic anemia and chronic idiopathic purpura, as it has been demonstrated that its treatment plays a role in the management of these diseases (7). Despite its great prevalence in developing countries, the epidemiology of *Helicobacter pylori* infection is not yet well understood. There are risky groups identified, including people who spent their infancy in developing countries (15), some ethnic groups (1) and health workers (2). In developed countries, the prevalence of the infection in children is typically less than 10%, and incidence rates are lower than 1%, whereas in developing countries the prevalence in children is greater than 25%, and the incidence ranges from 6 to 14% by year (8,14). Intrafamilial transmission is particularly important, and the offspring of infected women have a significant risk of acquiring the infection (3). Furthermore, there is an inverse relationship between socioeconomic status and the prevalence of the infection. Unfortunately, it is not possible to estimate the prevalence of this infection in our country, because most of the studies are conducted in urban slums and deprived communities, with low income and educational level. Recently, there has been a significant reduction in infant mortality rates and the life expectancy is increasing, mainly due to improved access to health facilities and basic sanitation (10). In other countries, similar social changes have produced a decrease in the prevalence of the infection, particularly in high-risk groups (11).

The present study is a prevalence study, and it aims to evaluate the prevalence of *H. pylori* infection in toddlers and school children from the school dedicated to sons of employees of the Universidade Federal de Sâo Paulo (UNIFESP). All children attending the day-care center for sons of the employees of the UNIFESP were eligible. The employees are either administrative or health professionals. Two hundred and thirteen children ranging from 7 months-old to 7 years-old (116M/97F) were evaluated (mean age 3.88 ± 2 yrs.). The school performs yearly (every February) stool examination for intestinal parasites. Exclusion criteria were chronic diseases requiring continuous treatment, antibiotics taken in the previous 30 days and refusing consent. On the study entry, the parents answered a structured questionnaire and provided a stool sample of their children. The parents were given an informed consent form when they were invited to the study, and they signed this form.

Helicobacter pylori was diagnosed using a commercially available stool antigen test (HpSA). The stool samples were collected the previous day and kept at 4ºC (refrigerator) until they were delivered to the study team. Then, the stool samples were stored at -20ºC until running the test. The stool antigen test was the HpSA (Premier Platinum, Meridien Bioscience, Cincinnati, USA), a direct immunoassay performed according

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to the manufacturing recommendations with some minor modifications (13). An optical density above 0.16 was regarded as a positive test, whereas an optical density less than 0.14 was regarded as a negative test and in between values were named inconclusive. This method was previously validated by our study group, with high sensitivity (94.6%) and specificity (96.5%) (13).

HpSA was positive in 28 children (13.1%), whereas 16 (7.5%) had inconclusive results and 169 (79.3%) negative results After excluding the inconclusive results, 197 children remained, with 28 of them infected with *H. pylori* (14.1%). The stool examination was positive in 16 children (7.5%), with *Giardia intestinalis* in 15 (7%) and *Trichiurus trichiura* in one child (0.5%).

The mean age of infected children was greater than non-infected ones (4.61 yrs ± 1.82 vs. 3.73yrs ± 2). Risk factors to *H. pylori* infection according to univariate analysis are shown in Table 1. The infection was significantly associated with age, race (non-white) and lower maternal educational level (less than 11 years of school) at univariate analysis. Additionally, there was a marginal significance in the relationship between *H. pylori* infection and sex (male), lower maternal age, household density and lower familial income. There was no association between positive stool examination for intestinal parasites and *H. pylori* infection, as 2/16 children with positive stool examination had a positive HpSA (12.5%, Fisher exact test P = 1).

The multivariate analysis is shown in Table 2. All variables associated with a significance level < 0.2 were included in the logistic regression model, then variables were excluded by backward selection. After this procedure, four variables remained in the model (Table 2). Age (P = 0.05) and household density (P = 0.031) were significantly associated with *H. pylori* infection in the multivariate analysis, whereas a marginally significant

Table 1. Risk factors for *H. pylori* infection in 197 children.

Risk factor	*H. pylori*		P
	positiven (%)	negativen (%)	
Sex, male	17 (18.9)	73 (81.1)	0.085
Age (average ± standard deviation)	4.61 ± 1.82*	3.73 ± 2*	0.030
Race, non-white	14 (21.2)	52 (78.8)	0.046
Years of school ≤ 11 years, mother	25 (17.4)	119 (82.6)	0.037
Maternal age (X ± SD)	32.82 ± 6.69*	34.93 ± 5.64*	0.076
Years of school ≤ 11 years, father †	23 (15.2)	128 (84.8)	0.488
Parental contact with patients	22 (16.1)	115 (83.9)	0.262
Paternal age (X ± SD)	35.32 ± 6.24*	37.06 ± 6.04*	0.184
Number of people in the house (X ± SD)	4.25 ± 1.65	3.81 ± 0.99	0.053
Number of siblings (X ± DP)	1.32 ± 1.39	1.12 ± 1.38	0.472
Number of rooms at home (X ± DP)	4.61 ± 1.93	5.22 ± 1.85	0.106
Pets in the home	13 (18.1)	59 (81.9)	0.241
Bed sharing	8 (16.6)	35 (81.4)	0.351
Peptic disease in the family	8 (14.8)	46 (85.2)	0.882
Familial income ≤ 4 x the minimum wage *	14 (20.3)	55 (79.7)	0.077
Total	28 (14.2)	169 (85.8)	

* years; † data not available for one subject. Qualitatite variables compared with Pearson chi-square test (or Fisher exact test) and numeric variables compared with logistic regression.

Table 2. Variables associated with *H. pylori* infection in the logistic regression model.

	AdjustedOdds ratio	95% Confidence Interval	P
Age	1.260	1.000 – 1.586	0.050
Number of people in the house	1.588	1.043 – 2.419	0.031
Paternal age	0.925	0.853 – 1.003	0.058
Years of school ≤ 11 years, mother	3.206	0.691 – 14.884	0.137

association (P value between 0.05 and 0.1) was observed between the infection and paternal age.

The study presents two main limitations: the study population and the diagnosis of the infection in the age group studied. Most studies in our country have been conducted in high risk communities, featuring low income and low educational level. This choice for deprived communities leads to excessive homogeneity and impairs the identification of risk factors. The population studied herein has an income similar to that of the population in the city of São Paulo , as 35% of the study group have a familial income lower than 4 times the minimum wage by month (37.69% in São Paulo city in 2000) (5). On the other hand, the educational level is higher than the average educational level in São Paulo city, because 28.2% of the mothers reported 12 or more school years as compared to only 14.7% in São Paulo city (4). The population studied here is remarkable in its heterogeneity, with different levels of parental contact with patients during work. The risk of infection in health professionals depends on the amount of contact with patients (2). Nevertheless, a longitudinal study with adequate sampling of the population of our city would be the most appropriate study design to identify risk factors for *H. pylori* infection.

The diagnostic test needs to be locally validated, because the antigenic profile can be specific to the community where the test was developed, and this can affect the test performance. The HpSA was validated in our setting, and it had 94.6% sensitivity and 96.5% specificity (13). In this previous study, there were 4.5% of inconclusive results (gray zone), which is similar to the reported on the present study. Recently, it has been developed a new monoclonal stool antigen test, which is at least as accurate as HpSA (97.5% sensitivity and 94.7% specificity) and did not have any gray zone (6).

The average age of the infected children was significantly higher than non-infected ones (4.61 yr ± 1.82 vs. 3.73a ± 2), as generally occurs in epidemiological studies on *H. pylori* infection (8). The direct relationship between age and the infection can be explained by new infections acquired over time or by cohort effect, in which the difference in the prevalence between age groups is explained by a different risk of acquiring the infection in infancy between birth cohorts (8). Higher prevalence in older patients might mean that the incidence is decreasing. Several studies have reported a recent decreasing prevalence in developing countries due to improved socioeconomic conditions (11,12).

There was a significant relationship between household density and infection. Previous studies identified an inverse relationship between number of rooms and *H. pylori* infection; and other risk factors such as sharing dishes and utensils (8). On the other hand, there was no relationship between parents' patient contact during work and *H. pylori* infection in the kids. Fecal contact during work is an important risk factor to *H. pylori* infection, as well as contact with other biological material (2,16).

Recently, a study with health workers identified fecal contact as the only significant risk factor, and the study described a dose response (2). Another longitudinal study showed a higher *H. pylori* infection prevalence among dentists than in controls, with relative risk of 4 and adjusted odds ratio of 2.68 (CI 95%: 0,55-19,67) (9). There is no study evaluating the risk of acquiring the infection among the offspring of health professionals, but it seems the higher exposure rate is compensated by the higher educational level, avoiding intrafamilial transmission. We conclude that there is a low prevalence of *H. pylori* infection in the studied population, and that contact of the parents with patients during work is not a risk factor to *H. pylori* infection in the offspring.

RESUMO

Baixa prevalência da infecção por *Helicobacter pylori* avaliada pelo teste do antígeno fecal em estudantes pré-escolares e escolares

O estudo avaliou a prevalência da infecção por *Helicobacter pylori* em crianças pré-escolares com o teste do antígeno fecal. *H. pylori* foi detectado em 28/213 (13.1%), sendo fatores de risco número de pessoas no domicílio e idade. Concluímos que a infecção possui baixa prevalência na população estudada

Palavras-chave: Helicobacter, saúde escolar, riscos ocupacionais

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