

Seroepidemiology of *Helicobacter pylori* infection among asymptomatic Chinese children

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INTRODUCTION

Increasing data has demonstrated that *Helicobacter pylori* (*H. pylori*), a spiral gram negative bacterium, colonized in human stomach, can cause type B gastritis^[1-3], is strongly associated with gastric and duodenal ulceration^[4-6], and has been implicated in the causation of gastric carcinoma^[7-9] and mucosa-associated lymphoid tissue (MALT) lymphomas^[10-11]. It has been reported that there is relationship between *Helicobacter pylori* infection and children's gastroenterologic disease, the most convincing evidence of the role of *H. pylori* in peptic ulcer disease is provided by studies showing that recurrence rate of ulcer is markedly reduced by eradication of the bacteria from the gastric antrum^[12-15].

Recent partly retrospective epidemiologic study in adults suggested that *H. pylori* infection mainly occurred during childhood^[16-18], and its actual colonization in gastric mucosa would be determined by many factors during childhood^[19-21]. In the previous studies, we have demonstrated that the prevalence of *H. pylori* infection of children with gastrointestinal disease is high^[22]. Therefore, children are considered to be the highest risk population.

This study was undertaken to determine the prevalence of *H. pylori* infection, among asymptomatic Chinese children, and its relation with the socioeconomic status of their families.

MATERIAL AND METHOD

Study subjects

Of 1119 children aged 7 - 14 years from three primary schools (one public school in rural area, one private school and another public school in urban area) in Shanghai, China, 568 are male and 551 are female.

Sample collection and methods

A questionnaire was given to the parents of all children. The questionnaire gathered sociodemographic information, parent occupation and life habit including feeding habit for children, and information on household density (number of adults, children and rooms, not including bathrooms, toilets, and small kitchens).

A serum sample (1.5mL) was obtained from each subject and stored at -20°C and assayed in batches for *H. pylori* IgG antibodies using a commercial enzyme linked immunoadsorbent assay (ELISA), Helico Bio-Rad GAP IgG kit. Using these criteria, the sensitivity of the ELISA is 100% with specificity of 92%.

Statistical analysis

Data were analyzed using the statistical package of SAS. The prevalence of *H. pylori* infection in different age was assessed using the χ^2 test. Differences with *P* values lower than 0.05 were considered statistically significant.

RESULTS

H. pylori seroprevalence in asymptomatic children

Questionnaires were returned from 1119 subjects, aged 7-14 years. Serum *H. pylori*-IgG antibodies of 1119 children were measured by ELISA method and showed that 458 children were *H. pylori* seropositive (40.93%). Two hundred and fifty-eight of 568 boys were positive (45.42%) and 200 of 551 girls were positive (36.38%). Seroprevalence of *H. pylori* for boys was significantly higher than that of girls (*P*=0.002).

The age and seroprevalence rates of *H. pylori* infection are summarized in Table 1. From Table 1 we can see that seroprevalence of *H. pylori* increased significantly with age, the mean increasing rate being 3.55% per year from 7-11 years of age.

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Table 1 Prevalence of *H. pylori* infection of children aged 7-12 years

Age (year)	No. of samples	No. of positive samples	Rate(%)
7	165	51	30.91
8	146	51	34.93
9	167	65	38.92
10	167	77	46.11
11	226	110	48.67
12	167	79	47.30
Total	1119	458	40.93

***H. pylori* prevalence in rural and urban area**

One hundred and seventy-one of 543 children living in urban area, and 287 of 576 living in rural area were positive. Seroprevalence rate with reference to age and distribution (rural and urban) are shown in Table 2. The overall prevalence in rural area was significantly higher than that in urban area.

***H. pylori* prevalence in different families**

Prevalence of *H. pylori* in children lived in different families is shown in Tables 3 and 4. These results showed that *H. pylori* seropositivity rate was significantly higher in children whose parents were engaged in manual occupations than in children whose parents with non-manual occupations.

Table 2 Comparison of community distribution in asymptomatic children with *H. pylori* infectionV

Age (year)	Urban			Rural			P value
	No. of samples	No. of positive samples	%	No. of samples	No. of positive samples	%	
7	88	21	23.86	77	30	38.95	0.036
8	69	11	15.94	77	40	51.95	0.001
9	90	33	36.67	77	32	41.56	0.518
10	83	32	38.55	84	45	53.57	0.052
11	92	40	43.48	134	70	52.54	0.195
12	40	9	22.50	127	70	55.12	0.001
13	39	12	30.77				
14	42	13	30.95				
Total	543	171	31.95	576	287	49.85	0.001

Notice: Children aged 7-11 years are from public schools and of 12-14 years are from private schools.

Table 3 Prevalence of *H. pylori* of children lived in different families

Group	No. of samples	No. of positive samples	Prevalence (%)
Peasant	41	18	43.90
Worker (including peasant worker)	580	278	47.93
Intellectual	452	148	32.74 ^a
Other	46	14	30.43 ^a

^a $P < 0.005$ intellectual and other families vs worker's and peasant's families.

Table 4 *H. pylori* infection rate of children aged 7-14 years in different families

Age	Peasant		Worker		Intellectual		Other	
	n	No. of positive (%)	n	No. of positive (%)	n	No. of positive (%)	n	No. of positive (%)
7	9	3 (33.33)	83	29 (34.94)	64	17 (26.56)	9	2 (22.22)
8	8	4 (50.00)	85	39 (45.83)	44	7 (15.91)	9	1 (11.11)
9	6	3 (50.00)	95	42 (44.21)	59	19 (32.20)	7	1 (14.29)
10	6	3 (50.00)	89	46 (46.46)	56	26 (46.43)	6	2 (33.33)
11	6	2 (33.33)	121	62 (51.24)	93	40 (43.01)	6	6 (100.00)
12	6	3 (50.00)	95	59 (62.11)	58	15 (25.86)	8	2 (25.00)
13	0	0 (0.00)	2	1 (50.00)	36	11 (30.56)	1	0 (0.00)
14	0	0 (0.00)	0	0 (0.00)	42	13 (30.95)	0	0 (0.00)

DISCUSSION

The epidemiology of *H. pylori* infection in human is interesting, particularly in regard to gastroduodenal disease associated with gastric colonization by the organism. But most epidemiologic studies of *H. pylori* infection have been performed in adults^[7,18]. Data on the incidence of *H. pylori* infection in children are limited^[23-26]. These factors such as age, socioeconomic level and living conditions, especially during childhood, have been considered to be important determinants in the acquisition of the microorganism. In developed countries the prevalence of *H. pylori* infection among children is low, in contrast to what is observed in developing countries, where most children are infected by the age of ten. In seroprevalence studies from western

Australia^[27] and Canada^[28], *H. pylori* was predominantly acquired in childhood. In addition, individuals born in an earlier birth year had a higher risk of acquiring *H. pylori* than those born in a later one. In a study from Toronto *H. pylori*-specific IgG serum antibodies were identified in 74% of parents and 82% of siblings of children with culture-proved infection^[29]. In the same study, seroprevalence in the control group was 24% and 13% for parents and children, respectively. Clustering of *H. pylori* infection among families suggested that acquisition of the infection in childhood might be due to the transmission from person to person.

The present study has shown that *H. pylori* infection rate of Chinese asymptomatic children is high. The mean infection rate of *H. pylori* of 1119

subjects aged 7-14 years is 40.93% and 45.42% among boys and 36.38% among girls. Infection rate in boy is significantly higher than that in girls ($P=0.002$). This result is different from the data of small sample that we reported previously (no difference in sex). Our results showed that seroprevalence of *H. pylori* increased significantly with age in asymptomatic children, *H. pylori* infection rate is 30.90% in children aged 7 years; 34.93%, aged 8 years; 38.92%, aged 9 years; 46.11%, aged 10 years; 48.67% aged 11 years; and 47.30% aged 12 years. The prevalence rates were similar to that reported by Pelsler^[30].

Our results also showed that *H. pylori* infection of Chinese children is influenced by many factors such as socioeconomic status, hygienic condition, cultural level, life habit particularly non-separate feeding, etc. The prevalence of *H. pylori* in rural area is higher than that in urban area (49.83% vs 31.48%, $P=0.001$). There is an inverse relationship with the socioeconomic status of the family. *H. pylori* infection rate of children is not the same in different families. It was 47.93% in worker's family, 43.90% in peasant's family, 32.74% in intellectual family, and 30.43% in other families with higher income. Therefore *H. pylori* prevalence of children from non-manual families is lower than that of children from manual families (30.42% - 32.74% vs 43.90% - 47.93%, $P<0.005$). We also found that there is an association between high prevalence and household density, close personal contact, particularly common use of the same bowl. These may provide the opportunity for transmission of infection from parents to children.

CONCLUSION

H. pylori prevalence among Chinese children is high and it increases with age. It has an inverse relationship with the socioeconomic status of the children's family.

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