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Original Article

Seroepidemiology of *Helicobacter pylori* in primary school students in Krotek, Cibeber Village, Serang District, Banten, Indonesia

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Abstract

Background *Helicobacter pylori* infection is a common infection. Risk of infection in rural areas is six times higher than in urban areas.

Objectives To study the prevalence of *H. pylori* infection in primary school students in rural area and its contributing factors.

Methods A cross-sectional study was performed in a rural primary school in Serang district, Banten, West Java. Serology of *H. pylori* was tested using Bio M pylori kit (Mataram, Indonesia).

Results Forty two of 125 subjects (33.6%) had positive *H. pylori* serologies. Bivariate analysis found that the the family habit of eating together from one container increased the infection risk 5.93 times (95% CI 3.07 to 11.43). Source of drinking water from common river increased the risk 9.88 times (95% CI 3.03 to 32.24). Bed and bedroom sharing increased the risk 1.55 times (95% CI 1.23 to 1.95) and 2.22 times (95% CI 1.65 to 2.99), respectively. Multivariate logistic regression analysis including all variables with P <0.25 showed that the most significant factor contributing to *H. pylori* infection is common river as family drinking water source (OR 24.97, 95% CI 3.9 to 159.76), followed by family habit of eating together from one container (OR 10.23, 95% CI 3.05 to 34.27), and bed or bedroom sharing (OR 9.48, 95% CI 2.47 to 36.38).

Conclusion Prevalence of *H. pylori* infection in rural school students is 33.6%. There are significant associations between *H. pylori* infection and family habit of eating together from one container, bed sharing with other family members, and family drinking water source from common river. **[Paediatr Indones. 2009;49:269-74]**.

Keywords: *recurrent abdominal pain, nutrition status, Bio M pylori kit, reverse flow immunochromatographic test*

Infection of *Helicobacter pylori* is a common infection, affecting estimated 50% of world population.[1] Incidence of *H. pylori* is high especially in developing country such as Bangladesh. Incidence in rural areas of West Virginia, Unites States, is reported to be higher than in urban areas. Risk of *H. pylori* infection in rural areas is six times higher than in urban areas.[2,3] Human transmissions of *H. pylori* through oral-oral, fecal-oral and gastric-oral routes have been widely studied.[4] Epidemiology of the infection is very complex, many factors can contribute to the infection of *H. Pylori*. Several studies identified low socio-economic status as risk factor for high incidence of infection, including several people sharing a house, bedrooms or beds with infected individuals, no access to clean water source, and poor sanitation.[2,3]

This study was a part of a large study on *H. pylori* infection screening, diagnosis and management of eradication in Gastrohepatology Division, Departement of Child Health, Medical School, University of Indonesia. The aim of this study was to find the

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prevalence and epidemiological risk factors of *H. pylori* infection in rural primary school students.

Methods

The study was performed in Krotek Village, Cibeber, Serang District, Banten, Indonesia. The village area was 6.08 km^2, with population of 10,424, and density of 1,714 people/km^2. Education facilities in the village consisted of two kindergartens, four primary schools and two junior high schools. Health facilities consisted of one large community health centre, two small centers, and three service-posts for basic maternal and child care. Public transportation facility was bicycle. The economy was mainly from farming and bricks production. Education level was mostly primary school. This village was selected because it was only 30 km from the district capital and was easily reached.

This study was s a cross sectional designed on prevalence and risk factors of *H. pylori* infection in primary school students in rural area. The study was conducted by the Gastrohepatology subdivision, Department of Child Health, Medical School, University of Indonesia, Jakarta. It was started in August 2008 until the target number of subjects was achieved.

Questionnaire was used to collect the subject profile, anthropometry, number of siblings, history of recurrent abdominal pain in subjects and their parents, epidemiology, and socio-economics data. Each student then had their venous blood samples collected for serology test of *H. pylori* (using Bio M Pylori kit, from Mataram Laboratory, Indonesia).

Bio M pylori kit

Bio M pylori kit is a serology test manufactured by Mataram Laboratory, Indonesia, using local antigen to be examined by reverse flow immunochromatographic test principle. Every kit consists of nitrocellulose membrane coated with *H. pylori* antigen in the test line. Antibody in the serum will bind to the antigen on the surface membrane, then the antibody (of IgG type) bound to the antigen will capture protein-A labelled with gold colloid and show a red line. In the membrane, there is a control line that will always show in every test.

Data analysis

Data analysis was performed using SPSS program version 16.0 software. Results were shown in parametric and non-parametric test using Kolmogorov Smirnov test. The effect of multiple variable was evaluated using logistic regression. The study was approved by The Committee of The Medical Ethics of Medical School, University of Indonesia. A P value of 0.05 was considered significant.

Results

This study collected 125 blood samples from primary school students aged 6-12 years (**Table 1**). Prevalence of *H. pylori* in this study was 33.6% (42/125 subjects). The relationships between positive *H. pylori* result and subject characteristics and other variables are described in **Table 2**. Bivariate analysis from **Table 2** shows that the family habit of eating and drinking together from one container was associated with incidence of *H. pylori* infection (OR 5.93, 95% CI 3.07 to 11.43), bed and bedroom sharing with other family members also showed significant association with *H. pylori* infection incidence (OR 1.55, 95% CI 1.23 to 1.95 and OR 2.22, 95% CI 1.65 to 2.99). Source of family drinking water from river had increased risk of 9.88 times (95% CI, 3.03 to 32.24) for *H. pylori* infection, compared to other water sources. Parental history of dyspepsia also had significant association with incidence of *H. pylori* infection in children.

Table 3 shows logistic regression analysis of several significant variables. Variables affecting *H. pylori* infection was family habit of eating or drinking together from one container, bed or bedroom sharing with other family members, and family drinking water source.

Table 1. Subjects characteristics grouped by age and sex

Variables	Number	Percentage
Sex		
Male	57	45.6
Female	68	54.4
Age (years)		
6-8	62	49.6
9-10	40	32
11-12	23	18.4

Table 2. Relationships between various risk factors and infection risk of *H.pylori*

Variables		Test Results		P
		Positive	Negative	
Sex	Male	20	37	0.747
	Female	22	46	
Age (years)	6 – 8	17	45	0.287
	9 – 10	17	23	
	11 – 12	8	15	
Nutrition status	Low	18	26	0.202
	Good	24	57	
Family income	Under minimum	32	62	0.855
	Minimum or higher	10	21	
Father education	No school	0	5	0.694*
	Primary (not graduate)	7	20	
	Primary (graduate)	25	45	
	Junior high school	9	9	
	Senior high school	1	3	
	Academy / university	0	1	
Mother education	No school	2	10	0.998*
	Primary (not graduate)	16	31	
	Primary (graduate)	19	35	
	Junior high school	5	6	
	Senior high school	0	1	
	Academy / university	0	0	
Father occupation	Labor	16	20	0.137*
	Trade	7	15	
	Farm	11	14	
	Civil government	0	7	
	Private / business	8	27	
Mother occupation	Labor	9	24	0.998*
	Trade	5	5	
	Farm	9	13	
	Housewife	15	34	
	Private / business	4	7	
Habit of eating/drinking together from one container	Never	2	38	0.000
	Sometimes	13	36	
	Often	27	9	
Number of siblings	0 – 1	1	4	1.000*
	2 – 3	18	35	
	More than 3	23	44	
Sharing of room with other family members	Yes	36	46	0.001
	No	6	37	
Sharing of bed with other family members	Yes	36	32	0.000
	No	6	51	
Family drinking water source	Well	22	74	0.000
	Government water system	4	4	
	River	16	5	
Child history of stomach complaint	Yes	3	8	0.642
	No	39	75	
Parent history of stomach complaints	Yes	34	66	0.850
	No	8	17	
Parent with diagnosis of dyspepsia	Ever	8	4	0.011
	Never	34	79	

* = Non-parametric test Kolmogorov-Smirnov

Table 3. Multivariate analysis of several variables with infection

Variables	OR	95% CI	P
Nutrition status	1.5	0.5 to 4.7	0.4
Father occupation (labor)	0.3	0.1 to 1.1	0.07
Habit of eating together from one container	10.2	3 to 34.2	0.00
Sharing of room with other family member	2.7	0.7 to 10.4	0.13
Sharing of bed with other family member	9.4	2.4 to 36.3	0.001
Family water drinking source	24.9	3.9 to 159.7	0.001
Parent with dyspepsia	0.7	0.1 to 4.9	0.7

Discussion

Prevalence of *H. pylori* infection in primary school children aged 6–12 years, in this study, was 33.6%. Another epidemiological serology study in Erzurum, Turkey reported prevalence of 56.8% in children aged 7 – 10 years.[5] The prevalence from this study is higher then those in several European countries. Prevalence of *H. pylori* infection in developing countries increases soon after birth and reaches 80-90% at the age of 20 years. In developing countries, *H. pylori* infections are less than 20% and increase 1% each year.[6,8]

Compared to studies in urban areas, a study by Hegar et al[9] in Jakarta (1996) using serology test on 153 primary school students reported that *H. pylori* infection in urban area was lower than in rural area, respectively 26.8% vs. 33.6%. Studies using serology performed in Taiwan and Australia reported similar results, showing that infection risk in rural areas were 2.6 times and six times higher, respectively, compared to urban areas.[7-10] Community living environment has increased *H. pylori* infection incidence associated with other risk factors such as low socio-economic status, high population, personal hygiene, and poor sanitation.[2]

Based on this study, prevalence of *H. pylori* in children aged 6 - 8 years was 22.9%, in age 8 - 10 years was 41%, and in age 10 years or older was 39.5%. These results are in accordance with studies by Selimoglu et al,[5] Lin et al,[10] and Windsor et al,[7] showing increasing prevalence with age. In this study, the peak prevalence was in age group of 8-10 years. A study in Jakarta reported decreasing seropositive prevalence of 47.6% in children aged 6–8 years, 39.9% in children aged 8-10 years, and 13.8% in children aged 10-12 years.[9] These differences may be due to low number of subjects and unequal proportion of number of subjects between age groups.

In this study, there was no significant difference between sex and risk of *H. pylori* infection (P=0.747). This result is similar to studies in West Virginia (485 seropositive samples) and Turkey (300 seropositive samples) which reported that sex was not a risk factor of *H. pylori* infection in children.[2,5,10] On the other hand, Hegar et al[9] performed a study in Jakarta which revealed that prevalence of *H. pylori* infection was higher in girls than boys (32.5% vs 19.4%, P> 0.05). This difference may be due to unequal proportion of number of subjects.

Nutritional status was not associated with incidence of *H. pylori* infection (P=0.202). This result is similar to a study by Quinonez et al,[11] on 380 school children aged 5-10 years in Guatemala, reporting no correlation between *H. pylori* infection and nutritional status.

Number of siblings was suggested to affect *H. pylori* infection. Selimoglu et al[5] and Camargo et al[12] reported more number of sibling enabled close human contacts in transmission of *H. pylori*. In this study, there was no correlation between number of siblings and incidence of *H. pylori* infection, but there was a trend of increasing infection with increasing number of siblings (0-1, 2-3 and >3 siblings were 20%, 28.3% and 34.3%, respectively).

In this study, bed and bedroom sharing with other family members showed significant association with incidence of *H. pylori* infection (P=0.001 and P<0.001). The risks of transmission in children who shared room with other family members were 1.55 (95% CI 1.23 to 1.95), and in those bed sharing with other family members were 2.22 (95% CI 1.65 to 2.99). These results were in accordance with previous studies by Farrel et al[13] and McCallion et al[14]. Logistic regression multivariate analysis showed significant association between bed sharing with other family members and *H. pylori* infection (P=0.001, OR 9.48 95% CI 2.47 to 36.38). Bed sharing allowed close personal contact, a key factor for increasing risk of infection. Bed sharing may facilitate transmissions through oral-oral, gastric-oral, or fecal-oral routes via saliva, vomit or poor personal hygiene.[14]

Studies by Farrel et al[13] and Rothenbacher et al[15] reported that children who slept with parents, infected by *H. pylori*, also had risk of infection. Parents who had habit of sleeping together with their child under the age of 5 years old allowed infection transmission from parents to children.

In this study, parents with history of dyspepsia showed significant association with *H. pylori* infection (P=0.011), but logistic regression analysis did not show any significant corelation. Further investigation is required to confirm *H.pylori* infection in parents with dyspepsia, knowing that infection rate is high (83.6%) in patients with epigastric pain due to non-ulcer dyspepsia.[16]

Prevalence of infection in children with history of recurrent abdominal pain in this study is 27.3%(P=0.64). Similar results was reported by Chen et al[17] in China, which revealed the infection of *H. pylori* was 17.5% (7/40 children with recurrent abdominal pain). This result is much lower compared to previous study by Das et al,[18] which revealed the infection of *H. pylori* was 77% (50/65 children age 3-12 years, with recurrent abdominal pain confirmed by histopathology). Those differences may be due to different host responses, bacterial strains, and number of colonies. We also need to consider that recurrent abdominal pain may be caused by a psychosomatic condition, especially in adolescences.[18]

Family habit of eating and drinking together from one container also showed significant correlation with *H. pylori* infection (P<0.001). This family habit clearly facilitated transmissions through oral-oral, gastric-oral, and fecal-oral routes via saliva, vomit, or poor personal hygiene.[14] Risk of transmission in children using the same container for food or drink with other family members increased the infection 10.23 times (95% CI 3.05 to 34.27).

Family source of drinking water had strong correlation with prevalence of *H. pylori* infection. Families with source of drinking water from river had prevalence of 83.3% (P<0.001). Logistic regression analysis showed drinking water from river increased the risk of infection 24.97 times (95% CI 3.90 to 159.76).This result is similar to previous study by Nurgalieva et al[19], in Kazakhstan, who reported that the prevalence of *H. pylori* infection using ELISA detection in families drinking water from river was as high as 97%. Water source from river increased the risk of infection 13.6 times compared to that from the goverment water system (P<0.001). Water from river can be source of infection because of fecal contamination from infected human or animals.[19] Infection can be prevented by boiling the water before drinking.

In conclusion, prevalence of *H. pylori* infection in rural school students aged 6-12 year is 33.6%. There are significant associations between *H. pylori* infection and family habit of eating together from one container, bed sharing with other family members, and source of family drinking water from common river.

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