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Significant Reduction in the Prevalence of Helicobacter Pylori Infection in Albanian Children

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Abstract

Background: In developing countries, Helicobacter pylori infection is very common and begins in the very early childhood.

Aim: To determine the prevalence of H pylori infection in Albanian children aged 8-10 years comparing with the data of the study in 1994 and to identify factors associated with H pylori infection.

Methods: The prevalence of H pylori infection was studied in 308 asymptomatic children between of 8 and 10 years from mixed urban and rural areas. Of two different districts of Albania. H pylori status was evaluated by stool antigen test (SAT). Urea-breath test were used in 1994 study. Demographic information, socio-economic feature, and living and hygiene condition, such as type of the house, number of person/children living in the house, practices related to water use and toilet facility were evaluated by a detailed questionnaire completed by the teachers with the cooperation of parent of each children.

Results: The overall prevalence of H pylori infection was 58%. Compared to the data of the 1994 study, there were a significant drop to 33%. There were no significant difference between males and female in both studies. The children who grew up in villages had a higher prevalence than those grew up in the city ($p<0.001$). There were no significant difference in H pylori infection prevalence between the three socio-economic classes. The prevalence were inversely associated with clean water index, crowding index and toilet facility, $p<0.001$ respectively.

Conclusions: This study confirms the nearly two-fold reduction in the prevalence of H pylori infection in Albanian children 8-10 years of age between 1994 and 2014, consequence of improvement in standard of living and hygiene practices. The childhood is a period of major risk for acquisition of H pylori.

Keywords: Helicobacter pylori, socioeconomic status, household condition, clean water.

Introduction

Helicobacter pylori (H pylori) is one of the most common human bacterial infection (1). Overwhelming evidence has confirmed H pylori as an component of chronic gastritis and a cause of peptic ulcer disease, gastric adenocarcinoma and low-grade gastric mucosa lymphoid tissue (MALT) lymphoma responsible for tremendous morbidity and mortality in both developed and developing countries (2, 3, 4, 5, 6, 7). The prevalence of H pylori infection in children has varied in different areas (9, 10, 11), with high rate of acquisition during early childhood in developing countries (12, 13, 14). So, in many developing countries, 40% to 60% of children aged 5 and 10 years were infected with H pylori (15, 16). Contrary, in developed countries, infection rates are significantly lower with less than half of the population infected by adulthood (17, 18).

Epidemiological studies suggest that parson-to-person transmission, by either fecal-oral or oral-oral routes to be the major mechanisms. The case for person-to-person transmission is supported by observations that factors such as lower socioeconomic status, lower level of education, poorer hygiene and sanitation, and house crowding are associated with a higher prevalence of H pylori infection (18). In Albania, the study in 1994 (Resuli B. Urea-Breath test for H pylori in Albanian children. Biomed Annual Workshop, 1996, Cambridge, England) found a very high prevalence of H pylori infection (91%) among the children aged 8-10 years (19). We conducted this study to determine the actual prevalence of H pylori infection in healthy Albanian children aged of 8-10 years comparing with the data of the study in 1994 and to identify factors associated with H pylori infection.

Methods

This prospective observational study included 308 unselected asymptomatic scholarships between ages of 8 and 10 years, 146 schoolboys and 162 schoolgirls from mixed urban and rural areas of two different districts of Albania (Tirana and Kavaja). Children were excluded if they had symptoms referable to the upper gastrointestinal tract or had taken antibiotics, antacids and peptic ulcer medicines in the month preceding the study. The study started in March 2014 and ended in August 2014. Members of the same family were excluded to prevent bias by known familial clustering. H pylori status was evaluated by stool antigen test (SAT) on account of its high sensitivity (95%) and specificity (94%) and entirely similar with ^{13} -C urea breath test (20) used in 1994 study. Verbal consent was obtain from all parents before the interview.

A detailed questionnaire was completed by the teachers with the cooperation of the parents of each child to obtain information regarding demographic data (i.e. sex and residence), medical history (such as Helicobacter pylori eradication therapy) upper gastrointestinal symptoms (indigestion, bloating, epigastric soreness, regurgitation, heartburn that persisted for at least one month within the last 3 years or history of peptic ulcer disease in the family), occupation of the parents, income, education level and living and hygiene condition regarding to the type of the house, number of rooms, number of person/children living in the house, type of the drinking water and toilet facility. Informed consent was obtain from each subject. Categorization of socio-economic class was based on the occupation and education of parents using a modification of the Hollingshead index (21). Three socio-economic status were identified : upper, middle and lower. A clean water index (CWI) was created on the practices related to water use. Categorization was based on a combination of four factors, such as the source of drinking water (tap, well or river), consistency of boiling water before drinking (always, sometimes or never), restoring and reusing water (never, sometimes or always) and frequency of bathing and showering (2-3 times/week, less than 2-3 times/week and once a week or less), as high, middle or low. The crowding index in the home was defined as a total number of family members in the home divided by the total number of rooms in the home (low, moderate or high). A stool sample was collected by parents at home, who were provided with a written instruction on how to collect a stool sample (into clean, dry plastic jars with screw-cap lids), to deliver to lab right way or to refrigerated and then to take to the lab as soon as possible. The results were compared with those of our study conducted in 1994.

The Mantel-Heanszel X^2 test was used to assess the association between each independent variable in the study on the prevalence of H pylori infection. The 95% confidence interval was calculated for H pylori positivity associated with the study variables by multiple logistic regression model. The data were analyzed using the SAS program.

Results

A total of 308 children 8 to 10 years old participated in the 2014 study. The overall prevalence of H pylori infection was 58%. Compared with the prevalence of H pylori infection in the 1994 study realized in 480 children ranged in the same ages, we found a significant drop to 33% of the H pylori infection prevalence. Apart from this, there were no significant differences in the overall prevalence of H pylori infection between males and female in both studies. On the other hand, the children who grew up in villages had a higher prevalence of H pylori infection than those grew up in the city, p=0.001 and p=0.003 (Table 1).

Table 1: Helicobacter Pylori (HP) infection among Albanian children's 8-10 years (1994 vs. 2014)

Variables	1994 (n=480)				2014 (n=308)			
	HP neg. (n/%)	HP pos. (n/%)	X^2	p[1] value	HP neg. (n/%)	HP pos. (n/%)	X^2	p[1] value
Gender:								
Male	20/9	205/91	0.118	0.4	51/35	95/65	5.51	0.5
Female	25/11	230/89			78/43	84/57		
Total	45/9	435/91			129/42	179/58		
Community:								
Urban	29/11	236/89	38.8	0.001	78/84	28/26	16.5	0.003
Rural	26/9	189/91			100/49	102/51		
Total	55/11	425/89			178/58	130/48		

[1] p value was based on Mantel-Haenszel X^2 test

Table 2: Variables influencing the Helicobacter pylori infection in 308 Albanian children's aged 8-10 years based on multivariate logistic regression model

Variables	Total (n)	Helicobacter Pylori pos. (n)	OD	Cl 95%	p value
Economic class:					
Upper	32	19	reference		
Middle	142	85	1.46	0.68-3.14	0.332
Low	134	75	1.65	0.77-3.58	0.199
Clean water index:					
High	53	24	reference		0.001
Middle	149	78	3.22	1.64-6.33	0.001
Low	106	77	2.2	1.29-3.73	0.003
Crowing index:					
Low	142	63	3.2	1.67-6.15	0.001
Moderate	124	82	2.54	0.80-2.98	0.195
High	42	34	reference		
Toilet facility:					
Indoors	265	138	8.86	4.47-9.59	0.001
Outdoors	43	41	reference		

The association between H pylori infection and the demographic data are shown in Table 2. There were no statistically differences in H pylori prevalence between the three socio-economic classes. The prevalence of H pylori infection were inversely associated with the CWI ; 45% among children with the high CWI, 52% in those with middle CWI and 72% in children with low CWI ($p<0.001$). As seen in the Table 2, the number of children in the home is, as well, a strong predictor of H pylori infection. When the data of low crowing index compared with those of moderate and high crowing index, the odds ratio were 3.2, Cl 95% confidence interval 1.67-6.15, $p<0.001$. A well, we found a strong association between H pylori prevalence and toilet facility (odd ratio 8.86, 955 confidence interval 4.447-9.59, $p<0.001$).

Discussion

This is second study to report the epidemiology of H pylori infection in Albanian children between 8 and 10 years of age. The first study was conducted in 1994 in occasion of the European project and showed that 91% of Albanian children were infected (19). This terribly high prevalence of H pylori infection, having no difference between sex and residence (rural and urban areas), even higher than that found in Africa (22), was related evidently to the very poor socio-economic condition, low education level and inacceptable overall environmental factors, such as the general level of hygiene, lack of water supply and sanitation, and crowding in the household, suggesting that H pylori infection occur during the first years of life and that new infection are uncommon in adults. Our previous data on the prevalence of H pylori infection in an Albanian population sample, range from 20 yrs to 70 yrs, confirms that infection was common in all age groups (75% - 80%), with no correlation between age and material status (23), supporting the idea that most H pylori infection occurs in childhood and are not the result of constant recruitment of infection through the life (24, 25).

In this epidemiological study of two decade later, conducted in Albanian children of the same age and from the same urban and rural areas, 58% of children were infected with H pylori, similar to that found in some others developing countries (12, 26, 27). We believe that this dramatic drop in the prevalence of H pylori infection is effect of estimate improvement in standard in living condition, and taken together, of the overall environmental risk factor for H pylori transmission and possibly from the widespread use of antimicrobials for treatment of other common condition (28) or spontaneous elimination of H pylori infection (29, 30). A significant drop in the prevalence of H pylori infection has been observed also in some previous study (29, 31, 32).

In conformity with some other studies, we found that schoolboys were more likely to be infected (26, 33). Comparing with the data of the 1994 study, there were a significant difference in the prevalence of H pylori infection among children from rural areas and urban areas (Table 1). This may be explain by the most vigorous influence of the sources of infection, such as lower home hygiene and clean water, outdoors toilet, playing more frequently outside the house, swimming in the river or more opportunity to contact with animals.

In contrast to other studies (34, 35, 36, 37), we found no significant relation between socio-economic class and infection, believing that with regard to acquisition of H pylori infection, socio-economic class is acting as a proxy measure for conditions and practices within the household that increase the likelihood of transmission of the organism from infected to uninfected subject. On the other hand, it should be stressed that in Albania, socioeconomic levels do not differ markedly between social strate.

One of the most marked findings of the study was the strong association between the prevalence of H pylori infection and the clean water index, which provide a simple and very credible measures of household hygiene (38). Children who consistently used tap, ground well or boiled water before drinking, never used restored or reused water and who frequently bathed, has significantly lower prevalence of H pylori infection than children who obtain their drinking water from local stream, used restored or reused water, never boiling water before drinking and who rare bathed ($p<0.001$).

Crowding is another important indirect measure of household hygiene. As other authors (36, 39, 40), we observed a strong association between the prevalence of H pylori infection and number of children in the home. It is natural that high household density present many opportunities for spread of infection through close personal contact (41). In many instances, overcrowding will necessitate children sharing a bad, which is in fact a risk factor for infection independently of overcrowding (42). Close personal contact, such as sharing of the bad between parent and child may provide also the opportunity for transmission of infection from child to parent or vice versa. Intra-familial clustering of infection is well recognized and the same strain of organism have been identified in parents and their offsprings (43), strongly suggests that spread of infection occurs within the home. Apart from the intra familial clustering of infection, we believe that excessively important for the child-to-child transmission of H pylori infection is also the role of kindergartens or day care center. We found also that the prevalence of H pylori infection were much higher in children who used outdoors facilities compared to those with indoors toilets ($p<0.001$).

In conclusion, this study confirms the estimated two-fold reduction in the prevalence of H pylori infection in Albanian children 8-10 years of age between 1994 (91%) and 2014 (58%), consequence of improvement in standard of living in Albania. Despite of, Albania remains among the developing countries with high prevalence of H pylori infection. Also, our data demonstrated clearly that childhood is a period of major risk for H pylori infection and the importance of household living condition, such as low hygiene practices and clean water and high crowding index in the acquisition of H pylori infection.

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