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PREVALENCE OF *HELICOBACTER PYLORI* IN CHILDREN AND TEENAGERS IN TABRIZ, IRAN

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ABSTRACT

Seroepidemiologic studies in developing countries show a high rate of *Helicobacter pylori (H. pylori)* infections in children, in contrast to developed countries. The aim of this study was to evaluate the prevalence of *H. pylori* in children and teenagers in Tabriz, northwest of Iran.

In this prospective study 44 children and teenagers were randomly selected to study serum IgG against *H. pylori* using ELISA method.

Our results indicated the presence of IgG in 83.5% of test subjects (83.7% in females and 83.4% in males). In the 2-5 years age group 71.7% were IgG positive and this percentage increased by age, i.e., 95.2% recorded as IgG positive in the 14-18 years age group ($p<0.05$).

Considering the risk factors in relation to *H. pylori* infection, an increasing number of family members (above 3 persons) showed a statistically significant difference ($p<0.05$), while other factors such as economical situation of the family, educational level of parents and lack of a private room for children in the family didn't show significant differences ($p>0.05$).

In general, our findings indicate that the prevalence of *H. pylori* in Tabriz, like other developing countries is high from early age and increases further by age. More studies are needed to clarify the reasons for this high prevalence.

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INTRODUCTION

Helicobacter pylori infection plays an important role in the pathogenesis of peptic ulcer, gastritis and stomach cancer.[1-4] This infection has also been implicated in recurrent abdominal pains in children and teenagers.[5,6] Although there is controversy concerning the pathogenesis of *H. pylori* in non-ulcer dyspepsia and duodenitis in this age group,[5,7] generally this type of infection in children is accompanied with signs of dyspepsia, halitosis, weight loss, iron deficiency anemia, enteropathy with protein loss and short stature.[8,9] Usually the infection persists for years and is probably life long.[10] Results of many studies have shown eradication of the signs of infection after proper therapy.[3,9,11]

Epidemiologically the prevalence of the infection varies among countries because of different socioeconomical and nutritional conditions.[7,12,13] In developed countries such as the United States, west european countries and Japan, the prevalence of infection is low in children,[14,15] while a high prevalence is seen in developing countries such as southern America, eastern Europe, Africa and Asia.[7,16-21] The reason for differences in these countries is attributed to differences in life style, particularly the possibility of transmission among family members, person to person transmission and transmission through contaminated water and vegetables washed with contaminated water.[7,21-24]

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Different methods are used in diagnosing *H. pylori* such as rapid urease test, histopathological studies and bacteriological culture, but application of these methods are restricted in children because of invasiveness. Determination of serum IgG antibody against *H. pylori* is a sensitive and relatively simple method. The sensitivity and specificity of this method is 84% and 58-96%, respectively.[9,25,26]

MATERIAL AND METHODS

Blood samples from 444 healthy children and teenagers were collected after obtaining consent and the sera were stored at -20°C. Those having gastrointestinal complaints were not included in this study. Laboratory tests were carried out in the Immunology lab of Imam Khomeini Hospital of Tabriz for a duration of one year. First, purified *H. pylori* antigen is coated on the surface of microwells in the *Helicobacter pylori* IgG test (IBL kit, Germany). Then diluted patient serum was added to the wells and *H. pylori* IgG specific antibody, if present, would bind to the antigen. All unbound materials were washed away. After adding enzyme conjugate, it would bind to the antibody-antigen complex. Excess enzyme conjugate was washed off and substrate and chromogen were added. The enzyme conjugate catalytic reaction was stopped at a specific time. The intensity of the colour generated is proportional to the amount of IgG specific antibody in the sample. The results were read using a microwell reader compared in a parallel manner with calibrator and controls. A questionnaire was also filled for all of the test subjects, inquiring about age, sex, presence of dyspepsia, recurrent abdominal pains, socioecomic condition of the family and education of the parents. Subjects with antibody against *H. pylori* in positive or negative ranges (<0.79 or >1 indices) were included in our study and those who were in borderline range were excluded. Results of serologic tests and questionnaires were analysed using Cornfield's 95% test, chi-square, ANOVA and Mann-Whitney.

RESULTS

Four-hundred and forty-four subjects, aged 2-18 years were included in the study. The overall rate of infection for all examined individuals was 83.5% (83.7% for females and 83.4% for males). No statistically significant difference was found regarding sex ($p>0.05$) (Table I). In the 2-5 years age group 71.7% were IgG positive and this increased by age, as in the 14-18 years group 95.2% were recorded as IgG positive ($p<0.05$) (Table II). Annual rate of positivity in the 6-9 years group was 3.25%, in the 10-18 years group 0.4%, and in general in the 6-18 years group 1.28%. Mean age in positive and negative cases are shown in Table III.

No correlation was found between the rate of *H. pylori* infection and the risk factors, except number of family members (above 3 persons) which showed a statistically significant difference ($p<0.05$). Finally, the seroepidemiology of *H. pylori* infection before age 20 has been compared among different studies in various countries and the findings of the

Table I. Prevalence of *H. pylori* infection according to sex of children and teenagers.

Sex	No. Studied	Antibody against *H. pylori*			
		Positive		Negtive	
		No.	%	No.	%
Male	229	191	83.4	38	16.6
Female	215	180	83.7	35	16.3
Total	444	371	83.5	73	16.4

Table II. Subjects with IgG antibodies to *H. pylori* according to age of children and teenagers.

Age	Antibody against *H. pylori*				Odds Ratio (95%CL)	*p* value
	Positive		Negative			
	No.	%	No.	%		
2-5	71	71.7	28	28.3	0.38 (0.22-0.65)	0.0006
6-9	117	84.7	21	15.3	1.14 (0.66-1.98)	0.68
10-13	82	81.1	19	18.9	0.81 (0.45-1.44)	0.44
14-18	101	95.2	5	4.8	5.09 (1.99-12.98)	0.0007

Table III. Subjects with IgG antibodies to *H. pylori* according to mean age of children and teenagers.

Antibodies to *H. pylori*	Mean age ±SD			
	Male	Female	Total	*p*-value
Positive	9.8+4.6	10.0+4.3	9.9+4.4	0.89
Negative	6.5+3.2	7.9+5.0	7.6+4.1	0.27

Table IV. Seroepidemiology of *H. pylori* infection in children of developed and developing countries.

Country	Age (year)	% of *H. pylori* positive
France	0-10	3.5
	11-20	16.3
Bulgaria	2-8	5.4
	8-14	13.4
England	6-9	5
	15-20	9.9
Ivory Coast	0-10	55.2
	11-20	75
Nigeria	5-9	82
	10-19	92
Gambia	0-5	31.4
India	0-9	60
	10-19	69
Thailand	5-9	17.5
	10-15	50
Chile	1-3	25.5
	10-18	70
Brazil	0-8	27.5
	15-18	64.3
Tabriz (Iran)	2-5	71.7
	14-18	95.2

present study[27] (Table IV).

DISCUSSION

Results of epidemiologic studies have shown relatively significant difference regarding *H. pylori* infection among countries.[7,8,11-20,27] The rate of infection is higher in developing countries and the age of infected subjects is lower.[7,16,17,19] The level of antibodies to *H. pylori* infection (83.5%) in this study is high and the age of infected subjects is low, as it approches 71.7% and 84.7% in 2-5 year olds and 6-9 year olds, respectively. Still it increases to 95.2% in 14-18 year olds (Table II).

Our findings confirm other reports from developing countries (Table IV). Holcombe et al. showed *H. pylori* infection in 82% and 92% of 5-10 and 11-19 year old Nigerians.[19] Klein and coworkers reported 50% *H. pylori* positivity in 2 year olds from Peru (0.4). In an eastern European study carried out by Knapik and colleagues in Poland it was reported that the infection was 18% in early childhood and increased to 54% in teenagers 19 years old.[17] As indicated above, the prevalence of infection in developing countries is entirely different than that of developed ones, i.e., the prevalence of *H. pylori* infection in early ages is low. Asak and colleagues reported 5.3% and 18% for 0-9 years and 10-19 year olds in Japan.[7] Our results are similar to reports coming from developing countries.

Many studies have been carried out concerning the transmission of *H. pylori* infection in developing countries and it was shown that crowding, person to person close contacts, poor hygienic conditions and use of contaminated water for washing vegetables and fruits account for a higher prevalence.[7,22,28-30]

Thomas and colleagues studied the role of IgA in breast-milk in 1993, as in Gambia most breast-feeding children used to acquire *H. pylori* infection at the end of the first year of life. Their findings proved that neonates receiving IgA in breast-milk are protected from early infection. This protection continues up to nine months of age; afterwards the rate of infection increases as the level of antibody decreases.[9] These researchers also succeeded in isolation of *H. pylori* from stool specimens of Gambian milk feeders.[30] This isolation highlighted the oral-fecal route and the possibility of contamination of water.[8,17,19,30]

Regarding the sex of subjects studied, 180 females (83.7%) and 191 males (83.4%) were serologically positive, indicating no statistically significant difference (p= 0.86). This finding is in correspondence with other findings, as the Eurogast research group also found the same rate of infection in both sexes in 1993.[4] Oliveira also found the same rate for both sexes.[31]

In relation to economic condition, 82.1% and 84.1% of the subjects were *H. pylori* positive in poor and good economical conditions, showing no statistical differences (p= 0.82). This result confirms the report to Knapik et al. from eastern Europe,[17] but is in contrast to the results of Fiedorek and colleagues from USA in 1991 and the results of studies from Vietnam and Saudi Arabia.[32]

The studies of Russell and coworkers carried out in Chile (1993) concluded that poverty and richness can not influence the *H. pylori* infection rate, because the main factor in acquisition of the bacterium is contaminated water.[33] Direct transmission in families, institutes and other gathering centers has been reported. Mitchell and colleagues (1992) studied the way of transmission of *H. pylori* in 10 families and reported that children 7-16 years of age were responsible for 90%, 80% and 67% transmission of the bacterium to their fathers, mothers and brothers/sisters, respectively.[28] Transmission of *H. pylori* infection from other sources to children whose parents were *H. pylori* negative was also studied.[32] We also considered other conditions such as educational level of parents, number of persons living in a family, and the presence of private rooms for children, from which only the number of family members showed a statistically significant difference ($p<0.02$). Mendall and colleagues in their study of family living factors, such as number of family members and number of *H. pylori*-positive roommates, noticed a significant relation among the number of family members, lack of private rooms for children and rate of infection.[11]

Regarding abdominal signs including recurrent abdominal pains, nausea, vomiting, loss of appetite, abdominal pain and discomfort in *H. pylori* infection, it was proven that an increase in prevalence of infection related to age is seen in both symptomatic and asymptomatic children, but generally in those with *H. pylori* infection the above signs are seen remarkably.[5]

CONCLUSION

Our study showed a high prevalence of *H. pylori* infection in children and teenagers of Tabriz and confirms a young age of initial infection. Considering the risk factors in relation to *H. pylori* infection, increasing number of family members (above 3 persons) showed a statistically significant difference ($p<0.05$), while other factors did not. Other studies are needed to evaluate the hygienic condition of drinking water, irrigation of vegetables and their washing to clarify the reason for this high prevalence.

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