The Relation Between the Seroprevalence of Helicobacter Pylori Infections in Children and the Education Levels of Their Parents

Helicobacter Pylori Enfeksiyonu Seroprevalansının Anne-Baba Eğitim Düzeyi ile İlişkisi

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ABSTRACT Objective: Helicobacter pylori infections are one of the widely known infections in the world, and it has been known that it is of a significant role in the etiology of different gastroduodenal diseases. Helicobacter pylori is a common bacterium, and approximately 50 percent of the world's population has been estimated to be infected. Human are the principal reservoir. Helicobacter pylori is known as one of the important factors in the peptic ulcer, causing antral type chronic gastritis. Helicobacter pylori infection prevalence is higher in children in developing countries. In this study, the Helicobacter pylori seroprevalence in children living in the province of Van and its relation with the education levels of their parents were aimed to be investigated. **Material and Methods:** The Helicobacter pylori IgG antibodies of the blood samples taken from 913 children between ages 0-16 were investigated by seperating the sera with ELISA method. Helicobacter pylori IgG antibodies seperated from these blood samples were assessed by using Helicobacter pylori IgG Enzyme Immunoassay kits (General Biologicals Corp., Taiwan) and TKA-HDA (Italy) ELISA instrument. **Results:** In this study, the overall seroprevalence of Helicobacter pylori IgG was found to be 36.9%, and the ratio for girls was found as 39.6% and 33.9% for boys. Although the seroprevalence of the children whose mothers have primary education was found to be 41%, this ratio was found to be 0% in children whose mothers have university degree education ($p< 0.05$). Positivity rate was 36% in children with primary or high school-graduated fathers and 28% in those with university-graduated. **Conclusion:** The positive results were evaluated statistically in conjuction with ages and genders. Statistical analysis yielded no significant difference in terms of sex ($p>0.05$). Helicobacter pylori seroprevalence rate found at the highest among the mothers with the lowest education level and the children with the highest age level. No statistically significant effect of paternal education level was determined on seropositivity rates.

Key Words: Helicobacter pylori; child; seroepidemiologic studies; education

ÖZET Amaç: Helicobacter pylori enfeksiyonu, dünyanın en yaygın enfeksiyonlarından biridir ve çeşitli gastroduodenal hastalıkların etyolojisinde rol aldığı düşünülmektedir. Helicobacter pylori, yaygın bir bakteri olup yaklaşık olarak Dünya nüfusunun %50'sinin bu bakteri ile enfekte olduğu tahmin edilmektedir. Esas rezervuarı insandır. Helicobacter pylori, kronik antral gastritin sebebi olan peptik ülserlerin önemli bir etkeni olarak bilinmektedir. Gelişmekte olan ülkelerde Helicobacter pylori enfeksiyonu prevalansı çocuklarda daha yüksektir. Çalışmada, Van yöresindeki çocuklarda, Helicobacter pylori seroprevalansı ve anne-baba eğitim düzeyleri ile ilişkisinin araştırılması amaçlandı. **Gereç ve Yöntemler:** Sıfır-16 yaş grubu toplam 913 çocuktan alınan kanlardan ayrılan serum örneklerinden ELISA yöntemiyle Helicobacter pylori IgG antikorları araştırıldı. Kan örneklerinden Helicobacter pylori IgG antikorlarının saptanmasında Helicobacter pylori IgG Enzyme Immunoassay kitleri (General Biologicals Corp., Taiwan) ve TKA-HDA (Italy) ELISA cihazı kullanıldı. **Bulgular:** Çalışmada genel Helicobacter pylori IgG seroprevalansı % 36.9 olup bu oran kız çocuklarında % 39.6, erkek çocuklarda ise %33.9 olarak saptandı. Eğitim düzeyi ilköğretim olan annelerin çocuklarında H.pylori seroprevalans'ı %41 olarak saptanmış olmakla beraber Üniversite mezunu olan annelerin çocuklarda ise % 0 olarak saptandı ($p< 0.05$). Baba ilköğretim veya lise mezunu çocukların %36'sı, baba üniversite mezunu çocukların %28'i pozitifti. Pozitif Sonuçlar cinsiyetlere ve yaş gruplarına göre istatistiksel olarak değerlendirildi. **Sonuç:** Bu değerlendirmelere göre, cinsiyetler arasındaki seroprevalans oranları istatistiksel olarak anlamlı bulunmamıştır ($p> 0.05$). Helicobacter pylori seroprevalansı anne eğitim düzeyi en düşük ve yaşları en büyük olan çocuklarda en yüksek olduğu saptandı. Baba eğitim düzeyinin seropozitivite üzerinde istatistiki olarak anlamlı bir etkisi bulunmadı.

Anahtar Kelimeler: Helicobacter pylori; çocuk; seroprevalans; eğitim düzeyi

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Helicobacter pylori is a common bacterium, and approximately 50 percent of the world's population has been estimated to be infected. Human beings are the principal reservoir. The prevalence of Helicobacter pylori infection varies widely from geographic area, race, etnicity to socio-economic status and lower familial income. Rates appear to be higher in developing countries than in developed ones, with most of the infections occurring during childhood, and they seem to be decreasing with improvements in hygiene practices.[1]

Helicobacter pylori is associated with chronic antral gastritis that is related to duodenal ulcer, gastric ulcer, and probably gastric adenocarcinoma. The infection of Helicobacter pylori during childhood is considered an important risk factor for gastric carcinoma in adult life.[2]

Helicobacter pylori is associated with socioeconomic status, education level of the adults and of children's parents as well as family income.[3]

Children are at higher risk for the Helicobacter Pylori infection. It has been reported that the gastric cancer and atrophic gastritis risk will be greater in older ages if individuals are infected in younger ages. In addition to the fact that children are in higher risk group, family factors, the importance of hygene and producing chronic and complicated disease; identifying the disease in this age group is higly important.[4-6]

The aim of the study is to investigate the relation of seroprevalence of the H. Pylori infection to parental, especially motherly education in children.

MATERIAL AND METHODS

ELIGIBILITY CRITERIA OF THE STUDY GROUP

Children displaying anemia findings such as fatique and after hemogram, and with the complaints such as excretion of dark feces, nuisiea, vomitting, loss of appetite, satiety even after having very little meals, reflux, pain or epigastric burning in the upper abdomen, meteorism, reflux, as well as abdominal pain, dispeptic complaints, epigastric tenderness and not taking in asetil salicylate and other non steriod anti-inflammatuar drugs (NSAIDs) were enrolled into the study, applying to the Clinic of Pediatrics of Yuzuncu Yil University Hospital between June 2002 and 2003. Yuzuncu Yil University Hospital is the regional hospital to the provinces of Van, Hakkari, Bitlis, Mus and Agri, having lower socioeconomic and sociocultural levels in Turkey. These children appropriate for the eligible criteria constituted the material of the study. All essential data related to the children had been obtained from their parents. Blood samples obtained from the children applying to our clinic were referred to the microbiology and clinical microbiology departments with the forms to be filled out. Personal data in the forms consisted of such information as patients' history, the number of siblings, educational and professional information of the parents. Enrolled children into the study were classified as 0-6, 7-12 and 13-16 age groups in general, and statistical comparisons were performed between these groups. Rates of H.pylory IgG seroprevalance according to the ages of girls and boys were presented in Table 1. The comparisons made

TABLE 1: The *H. pylori* IgG seroprevalence according to the ages of girls and boys.

	Girls/ IgG			Boys/ IgG			Total/ IgG		
Age	Sayı	Pozitif sayı	% oran	Sayı	Pozitifsayı	%Oran	Sayı	pozitifsayı	%Oran
0-6	159	28	17.6	171	31	18.1	330	59	17.8
7-12	190	81	42.6	172	59	34.3	362	140	38.6
13-16	128	80	62.5	93	58	62.3	221	138	62.4
Total	**477**	**189**	**39.6**	**436**	**148**	**33.9**	**913**	**337**	**36.9**

TABLE 2: The comparison between the age groups of the children with positivity and educational status of their parents.

		Mothers' education level			Fathers' education level		
Age	Total	Primary school	High school	University	Primary school	High school	University
0-6	8	3	1	-	1	2	1
7-12	20	10	-	-	4	3	3
13-16	42	20	1	-	6	8	7
Total	**70**	**33**	**2**	**-**	**11**	**13**	**11**

between the age groups of the children with positivity and educational status of their parents were presented in Table 2.

PROVISION OF THE MATERIAL

Nearly 2 ml of blood drawn from all children was centrifuged at 3000 rpm for 5 minutes. Seperated serum samples were stored at -20 °C and investigated in one week.

INVESTIGATION OF H.PYLORI IGG ANTIBODIES

Previously keept in fridge, H.pylori IgG Enzyme Immunoassay kits (General Biologicals Corp., Taiwan) were taken at room temperature. Serum samples were diluted at the rate of 1/40 (200µl serum diluent to 5µl serum). All later stages were performed using TKA-HDA (Italy) ELISA device according to kit procedure. Later stages were composed of the following: 1) Diluted at the rate of 1/40, the samples of 100 ml were put into all blanks (calibrator, positive and negative control blanks), 2) The samples were incubated at room temperature for 30 minutes, 3) The samples were washed four times with a diluted buffer, 4) Enzyme-conjugate of 100 µl was added into all blanks, 5) An incubation was performed at room temperature for 30 minutes, 6) All samples were washed four times with a diluted buffer, 7) Reagen A+Reagen B of 100 µl was added into all blanks, 8) Incubation process was carried out at room temperature for 20 minutes, and 9) After adding 100 µl of stop solution, readouts of test results were performed under 450 nm optical intensity.

ASSESSMENT OF TEST RESULTS

A particular attention was paid for the blue colour in the blanks to turn into completely yellow. Within the 15-minute period after completing the experiment, microplates were placed under the reader, and the optical intensities were assessed at 45 nm wave length. In the assessment, optical intensity of cut-off calibrator and optical intensities of negative and positive controls, and optical intensities of the samples obtained from patients were compared. According to the optical intensity rates in all blanks, the results of the samples, the cut off values of which were measured, were recorded as negative or positive.

Statistical Analyses

The general statistical evaluations of the data we got were made taking the following traits into consideration: the age groups, gender, situations of preschool and post-school. The evaluation of these statistical data was made using Z- ratio test.

The study protocol was approved by the local research ethics committe, in accordance with the declaration of Helsinki, and written informed consent forms were obtained from all participants.

RESULTS

In this study, the H. pylori IgG antibodies were examined in the serum samples taken from 913 children (477 girls and 436 boys), and antibody positivity was found in 337 serum samples (36.9 %) (overall seroprevalence).

After we classified the subjects into three groups as 0-6, 7-12 and 13-16, it was seen a statistically significant difference in seropositivity ratio among the same age groups. While H. pylori IgG was found positive especially in 59 of 330 children from 0-6 age group (17.8%), the positivity rate was 38.6% in 140 of 362 children from 7-12 age group. Eight children of 0-1 age group in our study were newborns. H. pylori IgG was found in 3 of these

newborns. In conclusion, it was thought that these antibodies were transferred to the children from their mothers via placenta. The difference of seropositivity was found to be statistically significant between these groups ($p< 0.05$). The H. pylori IgG antibodies were found in 138 of 221 children who are in 13-16 age group (62.4%). When the seropositivity ratio of this group to 0-6 age group children was compared statistically, the difference was found to be significant ($p< 0.05$). However, no difference was determined in terms of seropositivity rates between the children who are at the school age in 7-12 age group and the ones at early adolescent levels in 13-16 age group ($p> 0.05$). In general, it was found that the rate increases as the age gets older, and so the highest rate was found in 15-16 age group (67.9%).

In the statistical analysis of seroprevalence of different kinds, the positivity was found to be 39.6 % in girls and 33.9% in boys; the statistically significant difference was found only in 10-11 age group. No statistically significant difference was found between genders, compared to the other age groups and general seroprevalence values ($p>0.05$).

Only 212 of 913 children's parent education information could be provided. Children in this group were divided into three subgroups as primary, high school and university levels. Maternal and paternal education levels could be reached in only 70 of the children diagnosed with H.pylori positivity (Table 2). The rates of H.pylori positivity and negativity according to the education level of their parents were shown in Table 3. When H. pylori IgG levels were examined according to the education levels of mothers, the seropositivity ratios were found to be as 41 % in primary education, 11 % in high school education level. This difference was found as significant ($p< 0.05$). The difference was found to be significant when the percentage (0 %) of seroprevalence of the children whose mothers have university education degree was compared to the ones whose mothers have primary and high school degrees ($p< 0.05$). When the H. pylori IgG seropositivity rate was assessed, the positivity was found 36 % in children whose fathers have primary and high school degree and 28% in those whose fathers are of university degree. The difference between those percentages was not found as statistically significant ($p> 0.05$).

DISCUSSION

In identifying of H. Pylori, the invasive and non-invasive tests are being used. The invasive tests are urease, culture, Polimerase Chain Reaction and histologic tests. Among non-invasive tests are urea breath test, serologic tests, excrement test (Helicobacter pylori stool Antigen=HpSA) and urine tests.[7] Serologic tests are more commonly being used. Enzyme Linked Immunosorbant Assay (ELISA) test is one of the mostly used methods of being not expensive, fast and easy, and easy to be used for big populations.[8,9] It has been fixed with the studies that the sensivity of new generation the ELISA tests in the markets is reaching 100 % and the specificity is 95%.[10] That is why, ELISA method was preferred in this study.

Worldwide, the Helicobacter pylori infection is one of the most commen chronic bacterial infections.[11] It was pointed out in the studies that the half of the elderly people in developed countries and 80-90 % of the population in developing countries are infected with H. Pylori[7]. It was observed that the infection is taken in early ages of life and continued during life time in the developing coun-

TABLE 3: The rates of *H.pylori* positivity and negativity according to the education level of their parents were shown in Table 3. n (%).

	Mothers' education level			Fathers' education level		
H.pylori IgG	Primary school	High school	University	Primary school	High school	University
Positive	33 (41)	2 (11)	-	11 (36)	13 (36)	11 (28)
Negative	47 (59)	16 (89)	8 (100)	20 (64)	23 (64)	28 (72)
Total	**80**	**18**	**8**	**31**	**36**	**39**

tries in which the number of family members is high and socio-economic status is poor.[7] This is also the same in Turkey.[12] It has been fixed that the infection ratio is 10% until the age 20 and 50-60% until the age 60. It is also known that the infection is acquired in childhood and carried forward to the older ages.[7,13]

The general H. pylori positivity was found high in our study among the 0-16 age group children as 36.9 %. The H. pylori prevalence rates of the children in studies, performed in France in 1989,[14] Finland in 1995,[15] England in 1996[16] and Japan in 1998,[17] were found lower than those determined in this study. This led us that H. pylori prevalence in our country as a developing country is higher than that in developed countries.

When the results of a study performed in different regions of Bengladesh was evaluated, it was seen that these results are higher than the ones in our study.[18,19] The H. pylori prevalence performed in children-age group in a study in Malasia in 1999 was found to be lower than the results obtained in our study.[20]

In a study performed by Ang et al.[21] it was stressed that there is a fast increase in the H. pylori prevalence in our country starting from school age. It was suggested that socioeconomic status and poor living conditions during the childhood period are defining factors. Furthermore, it was suggested that the hazardeous wastes which cannot be prevented from mixing to the drinkable water are another reason for high prevalences.

In a study performed by Goral et al. in Diyarbakir,[22] Turkish people living in Germany who migrated from other parts of Turkey and the ones who migrated from South Eastern Anatolia were compared, and no significant difference was determined as for the Helicobacter pylori prevalence in adult populations in both groups. However, it was suggested that there are significant differences between the children born in Germany and the ones migrating there. In our study, the seropositivity rates for the children in 0-6 age group, 7-12 age group and 13-16 age group are as follows: 17.8%, 38.6% and 62.4%, respectively. Despite the fact that our prevalence rates is lower than the ones obtained in Diyarbakır in 1995, they are higher than in the children whose families migrated Germany or born there. This notion supports that poor environmental and socio-economic conditions may have an effect on H. pylori prevalence.

The mainstay in our study was to determine the correlation between H.pylori prevalance and low level socioeconomic and cultural factors related to maternal and paternal education levels. Therefore, it was aimed in the study to compare the children emigrating to Germany, and so reaching higher socioeconomic and cultural factors due to an increase in their maternal and paternal education levels with those from South Eastern Turkey and with low maternal and paternal education levels inspite of the fact that both groups were originated from the same region.

Findings provided by many researchers were found to be in accordance with our findings in terms of the Helicobacter pylori seroprevalence.[23-26]

In different studies performed by Fiedorek et al.[27] and Staat et al.[25], it was suggested that the H. pylori prevalence in black children is almost twice more along Mexican border. They connected this result to the bad socioeconomic situation of the black children and their border-living status[25]. In our study, the overall seroprevalence was found to be lower than black children living in bad socioeconomic conditions and to be higher than white American children living in better socioeconomic conditions.

In a study performed by Mc Callion et al. in Ireland in 1999[23], it was found that the increase of the H. pylori prevalence in children is connected with parents' social status and occupations. Thus, while the H. pylori prevalence in children whose parents work physically was found as 38.3 %, the ratio was found as 23.5 % of the children whose parents are high educated and not worked in physical works. In our study, it was seen that familial education levels of 212 children whose parents' data we could provide were different from each other. It was determined that the difference is not significant when looked at H.pylori IgG seropositivity as

to fathers' education level, no matter how significant this difference is in terms of mothers' education level. In terms of mothers' education level, the H. pylori seroprevalence in children whose mothers can only read and write is 41%, high school degree is 11%, and the H. pylori seropositivity in children whose mothers have a university degree is 0%. This situation can be explained in a way that the hygiene in our society is closely connected with the education levels of mothers.

Despite the fact that there are studies mentioning parents' education level is not efficient in children for H. pylori seroprevalence,[28] our study which is parallel with some other studies[24,29] found that the prevalence is higher in children whose mothers are not well educated. However, there are other studies found that fathers' education level is not efficient in the H. pylori prevalence as in mothers' education level.[29] This shows that the hygiene in family is more related to mothers than fathers.

According to a study performed by Ang et al.[21], the H. pylori prevalence in our country shows a close paralellism with Hepatitis A which is known to be spread by fecal-oral way, and it is also known that both infections have been diminishing during the last years.

Many researchers all over the world[15,16,23,26,30-32] and from our country[28,29,33] are of the same findings parallel with the ones in our study. It was stated that there is no gender difference although some others stated that there is slightly difference.[26,34] In a study performed by Contanza et al.[26] in Mexica, environmental factors, such as living in a busy family, in the same house, sharing the same room and the same bed are significant for the prevalence, and these are parallel with our results as the indicators of bad socioeconomic status. Further studies will concentrate on possible differences, eating practices, hygiene and sanitary practices.

CONCLUSION

As a conclusion, it was seen in our study that the H. pylori prevalence in children from Eastern Turkey is higher compared with developed countries. Insufficient socioeconomic situations and low family education level are the main reasons of this high H.pylori prevalence. It was thought that the high prevalence among school children originates from inadequate education of hygiene habits in schools. That is why, the school children, parents and the teachers need to be rendered conscious for general hygiene subjects. There must be education and training programs in national education curricula starting from childhood for such habits as toilet hygiene, toothbrush, washing hands and feeding. The public must be informed about the effects of the H. pylori infection on human health. It is also high important to provide clean drinkable water and hygienic environment. This will give a rise to the public to convert themselves from a population under the effect of H. pylori to a healthier population and reduce unnecessary fiscal costs on the health budgets of the countries.

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