Helicobacter pylori Seropositivity in Kirkuk City Children and its Relationship with Upper Gastrointestinal Symptoms and Serum Magnesium

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Abstract

Helicobacter pylori is **one of the most common chronic bacterial infection worldwide distribution which infects at least 50% of world's human population. There is evidence that acquisition of *H. pylori* occur mainly in early childhood. The aims of this study were: A) to evaluate the early diagnosis and the seroprevalence of *Helicobacter pylori* infection among children in Kirkuk city by using an immunochromatography method which is rapid, visually read qualitative serologic test for the detection of human IgG antibodies to *Helicobacter pylori* in the patient's serum. B) investigation of the probable association of serum magnesium (Mg^{+2}) level with *Helicobacter pylori* infection in the patients.**

Blood samples were collected from one-hundred fifty two child patients asses the (60 boy and 92 girls) their age ranged between 1 month-16 years.

Helicobacter pylori **infection was diagnosed in 33 children (21.71%). The seroprevalence of *H. pylori* infection was an increase with children's age and there was a significant relationship between seropositivity and vomiting 8 (24.24%), magnesium 7 (21.21%). There was no significant relationship between RAP 24 (72.72%), chronic diarrhea 6 (18.18%) and sex as showed statistically by chi _square (x^2).**

We conclude that high serum magnesium level associated with high risk of infection with *H. pylori*. *Helicobacter pylori* infection increases with the children's age. There was no association between *H. pylori* infection and the gastrointestinal symptoms (RAP and chronic diarrhea, vomiting was excluded).

Keywords: ***H.pylori*****, Children, Serum Mg.**

الانتشار المصلي لعدوى بكتريا بوابات المعدة الحلزونية بين الاطفال في كركوك وعلاقته مع الاعراض المعويه ونسبة المغنيسيوم في المصل

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الخلاصة

بكتريا بوّابات المعدة الحلزونية هي من الإخماج البكتيرية المُزمنةِ الأكثر شيوعاً حول العالم وهي تُصيبُ على الأقل 50 % مِنْ سكانِ العالم. هناك ادلة على ان اكتساب البكتريا يحدث في مراحل الطفولة المبكرة. لقد كانت أهداف هذه الدراسة: أ) تقييم التشخيص المبكر والإنتشار المصلي لعدوى بكتريا بوابات المعدة الحلزونية بين الأطفال في مدينة كركوك وذلك بإستخدام طريقة Immunochromatography وهي طريقة مصلية نوعية، سريعة وبصرية القراءة للكشف عن الأضداد البشرية (IgG) ضد البكتريا في مصل المريض. ب) التحقق من الإرتباط المحتمل بين نسبة المغنسيوم في المصل وعدوى بكتريا بوابات المعدة الحلزونية في المرضى.

قمنا بتقييم مئة واثنين وخمسون طفلا تتراوح اعمارهم مابين شهر وستة عشر سنة وكان من بينهم 60 صبيا و92 فتاة.

تم تشخيص المصل الموجب ضد بكتريا بوابات المعدة الحلزونية في 33 طفلا (21.71%) وقد لاحظنا ان نسبة انتشار الاجسام المضادة للبكتريا في المصل تزداد بتقدم العمر. لوحظ إن هناك علاقة كبيرة بين الخمج بالبكتريا والتقيؤ 8 (24.24%), مغنيسيوم 7 (21.21%). لم يكن هناك علاقة كبيرة بين آلام البطن المتكررة 24 (72.72%)، والإسهال المزمن 6 (18.18%) أو الجنس كما تبين احصائيا باستعمال طريقة مربع كاي.

إستنتجنا إن نسبة المغنسيوم العالية في المصل لها علاقة بإرتفاع خطر الخمج ببكتريا بوابات المعدة الحلزونية. إن العدوى تزداد مع تقدم عمر الأطفال. لا توجد أية علاقة بين الخمج ببكتريا بوابات المعدة الحلزونية والأعراض المعدية المعوية (آلام البطن المتكررة والإسهال المزمن) مع إستبعاد التقيؤ.

الكلمات الدالة: بوابات المعدية، مغنيسيوم المصل

Introduction

Helicobacter pylori (*H. pylori*) is one of the most common chronic bacterial infections world-wide, and it is currently estimated that approximately half of the world's population is infected with the bacterium, however the prevalence of *H. pylori* is not regularly distributed world-wide [1]. *Helicobacter pylori* is an etiologic agent of peptic ulcer disease, primary gastritis, gastric mucosa-associated lymphoid-tissue lymphoma (MALT), and gastric adenocarcinoma [2]**.** The infection is more prevalent in developing countries, and it is associated with poverty and social deprivation and main risk factors include overcrowded households, poor sanitation and poor water supply [3].

There is evidence that acquisition of *H. pylori* occurs mainly in early childhood: a recent study from Germany, including children from a high-risk population for *H. pylori* infection, suggested that acquisition of *H. pylori* takes place within the first 2 years of life. In a study from the Gambia *H. pylori* prevalence range from 19% at 3 months of age to 85% by age 30 months. Infection may not be persistent in early age, however, in school-age children infection may be relatively stable and risk of re-infection, for example after eradication therapy, is low, a further increase in prevalence with age within populations reflects most likely a birth cohort effect rather than an increased rate of infection with age [4]**.** In western countries, the prevalence of infection has been decreasing during the past few decades [1].

It was generally believed that following acquisition of *H. pylori*, and in the absence of treatment, infection would persist throughout life [5]. Magnesium (Mg) seems to be an important factor for both gastric acid secretion regulation and for *Helicobacter pylori* survival and virulence [6]. *Helicobacter pylori* seems to induce alterations in host electrolyte (Ca^{+2} and Mg^{+2}) concentration, by increasing intracellular free Ca^{+2} concentration and by activating parietal cell protein kinase (PKC), and through the bacterial synthesis of the fatty acid methyleneoctadecanoic acid (MOA), in parietal gastric cells Mg concentration can modulate the acid secretion function, possibly by influencing the cellular calcium loading capacity and the permeability to the electrolyte [7].

Helicobacter pylori can transfer from mother to baby either during pregnancy or horizontally through breast-milk in the postnatal period and there are various pathways, such as person-to-person, fecal-oral and oral-oral transmission, play a role in transmission of the infection by feces, saliva or vomit potentially transmit the organism [8]. The presence of *H. pylori* in saliva, dental plaque, and feces and the lack of significant evidence of nonhuman or environmental reservoirs indicate that person-to-person spreading is probably a major transmission mechanism of this infection [9]. Immunoglobulin G (IgG) antibodies develop within several weeks of the onset of persistent *H. pylori* infection, and titers decline following elimination of the infection, frequently reverting to seronegativity within 1–2 years, although some persons who eliminate the infection remain seropositive for several years [10].

Diagnostic tests for detection of *H.pylori* are of two major categories, invasive tests require upper gastrointestinal endoscopy and noninvasive methods such as (ELISA, Immunochromatography, and Latex Agglutination tests), Saliva antibody test, Urine antibody test, *H.pylori* Stool antigen test (HpSA), Urea breath test [11]. Culture of multiple biopsy specimens from the gastric mucosa is considered the most accurate method. Unfortunately it has several limitations. It is technically difficult and time consuming and an isolation rate of only 75-90%, making it a highly specific test but of limited to moderate sensitivity. Histology is a highly sensitive test but like culture it is technically difficult and invasive. Rapid urease test is simple, inexpensive and easy, but there are reports of lower sensitivity. PCR is both highly sensitive and specific but it is expensive and inappropriate for screening. Breath test is noninvasive and indirect, however the accuracy of the test can be influenced by several factors. Serological test for screening pediatric patients is attractive because there are fewer infected children than adults, positive findings are more diagnostic for pediatric patients and they are simple, easy to conduct and inexpensive [12]. Currently, there is no true gold standard for the diagnosis of *H. pylori* infection [13].

The aims of the study were:

I. To evaluate the early diagnosis and the seroprevalence of *Helicobacter pylori* infection among children in Kirkuk city by using an immunochromatography method which is rapid, visually read qualitative serologic test for the detection of human IgG antibodies to *Helicobacter pylori* in the patient's serum.

II. To investigated the probable association of serum magnesium (Mg^{+2}) with *Helicobacter pylori* infection in patients.

Materials and methods

Study population: This study was carried out from October 2010 to April 2011, in which 152 pediatric patients were including 60 male (39.48%) and 92 female (60.53%). The age of the patients was between 1 month and 16 years. The sample collected from pediatric hospital and Azadi teaching hospital.

Sample collection and Questionnaires:

Blood samples (2 ml) were collected from each child and allowed to clot and the sera were separated and analyzed immediately for the detection of the *H. pylori*-specific immunoglobulin G (IgG). The remaining sera were frozen and stored at -20 ˚C until used for the estimation of the magnesium level.

Assessment of the pediatrics' health status and demographic characteristics was based on data from questionnaires. The questionnaires concerned the age, sex, history of recurrent abdominal pain, chronic diarrhea, vomiting. A questionnaire was filled out for each child by us [14].

Serum determination of IgG to *H. pylori*:

The determination of specific IgG antibodies was done using an ICT (Immunochromatography test). ICT test was performed by the commercial test kit ($ACON^{®}$) according to the instructions of the manufacturer.

Estimation of the serum magnesium level: Serum magnesium level was measured by using a commercial available kit (BIOLABO) and according to the manufacture instruction.

Statistical analysis: The data of the patients were analyzed using the chi-square (x^2) test.

Results and Discussion

Out of a total number of 152 patients blood samples, 60 male (39.47%) and 92 female (60.52%). Age group of the patients ranged from 1 month to 16 years. Thirty-three of these children were seropositive (21.71%) for *H. pylori* IgG and 119 were seronegative (78.28%) for *H. pylori* IgG. Out of the 33 seropositive children, 9 (27.27%) were male and 24 (72.72%) were female (figure 1). The difference was not statistically significant. The characteristics of the studied population are shown in the table 1. *Helicobacter pylori* Seropositivity was 21.21% in 1 month-5 years, 24.24% in 5-9 years, 18.18% in 9-13 years and 36.36% in 13-17 years age group (figure 2). The difference was statistically significant. One-hundred twelve (73.68%) had RAP. *Helicobacter pylori* Seropositivity rate was established in 24 (72.72%) of

children with and in 9 (27.27%) of children without recurrent abdominal pain. The difference was not statistically significant. *Helicobacter pylori* antibody positivity was 6 (18.18%) among children with chronic diarrhea and 27 (81.81%) in children without chronic diarrhea. The difference was not statistically significant. *Helicobacter pylori* seropositivity was 8 (24.24%) in children with vomiting and 25 (75.75%) in children without vomiting. The difference was statistically significant (Table1).

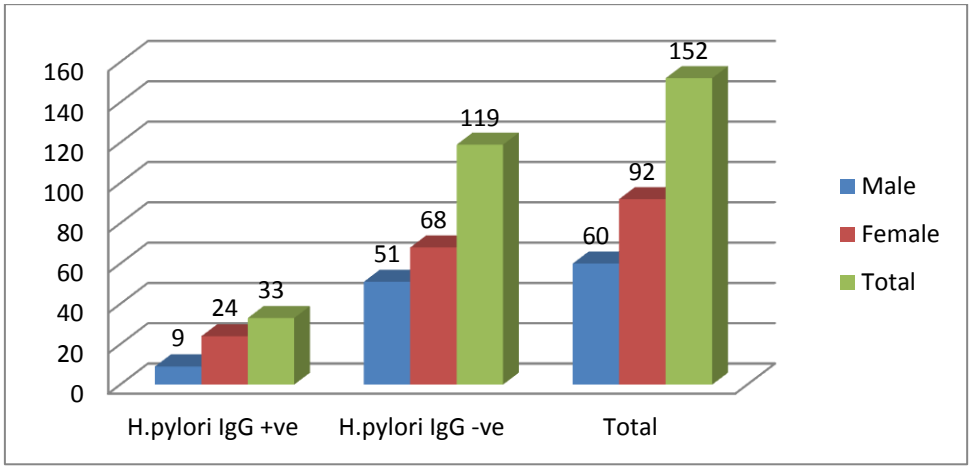
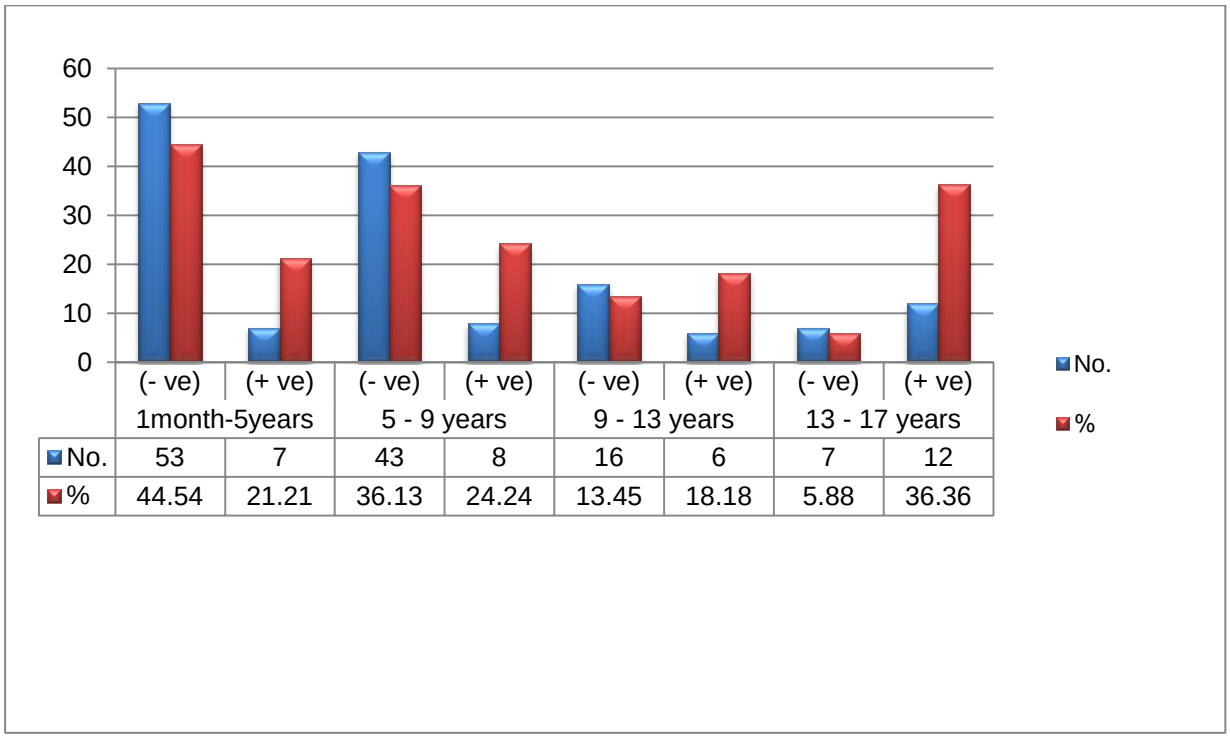


Figure 1. *Helicobacter pylori* specific IgG antibody results



	(- ve)	(+ ve)	(- ve)	(+ ve)	(- ve)	(+ ve)	(- ve)	(+ ve)
	1month-5years		5 - 9 years		9 - 13 years		13 - 17 years	
No.	53	7	43	8	16	6	7	12
%	44.54	21.21	36.13	24.24	13.45	18.18	5.88	36.36

Figure 2.Occurance of *H.pylori* infection in children of different age groups

TABLE 1.General characteristics of the study population

Characteristic	*H.pylori* Positive No. (%)	*H.pylori* Negative No. (%)	Total No. (%)
Age (months-years)			
1 month – 5 years	7 (21.21)	53 (44.54)	60 (39.47)
5 – 9 years	8 (24.24)	43 (36.13)	51 (33.55)
9 – 13 years	6 (18.18)	16 (13.45)	22 (14.47)
13 – 17 years	12 (36.36)	7 (5.88)	19 (12.5)
Total	33	119	152
Gender			
Male	9 (27.27)	51 (42.85)	60 (39.47)
Female	24 (72.72)	68 (57.14)	92 (60.52)
Total	33	119	152
RAP			
No	9 (27.27)	31 (26.05)	40 (26.31)
Yes	24 (72.72)	88 (73.94)	112 (73.68)
Total	33	119	152
Chronic diarrhea			
No	27 (81.81)	79 (66.38)	106 (69.73)
Yes	6 (18.18)	40 (33.61)	46 (30.26)
Total	33	119	152
Vomiting			
No	25 (75.75)	43 (36.13)	68 (44.73)
Yes	8 (24.24)	76 (63.86)	84 (55.26)
Total	33	119	152
Mg			
Mg ≤ 1.7	4 (12.12)	38 (31.93)	42 (27.63)
1.7<Mg≤2.2	22 (66.66)	72 (60.50)	94 (61.84)
Mg>2.2	7 (21.21)	9 (7.56)	16 (10.52)
Total	33	119	152

Helicobacter pylori is one of the most frequent chronic gastrointestinal bacterial infections and seems to occur predominantly in childhood. The prevalence of *H. pylori* infection is low among children in developed countries. In contrast, it is high in developing countries [8], [15]. Prevalence of *H. pylori* among children ranges from less than 10% to more than 80%. This prevalence is depending on the age, socioeconomic class and country of origin [16], [17], and [18]. In this study, the occurrence was 13.12% in age group 1 month-5 years, 17.65% in age group 5-9 years, 31.82% in age group 9-13 years and 66.67% in children 13-17 years of age. Similar to other findings [9], [19], [20], [21], the current study showed *H. pylori* infection increasing with the children's age in contrast to the results of [22], [23], [24] who reported that increasing age may led to the decline of the prevalence rate. The possible reason for this pattern may be that increasing antibody production with increasing age may have led to the decline of the prevalence [24]. In this study, it was found that there was no significant difference between the occurrence of *H. pylori* infection and gender. The rate of *H. pylori* infection was also not found to be related to gender in Taiwan, Korea, Mexico, and Rasht (Northern Iran) [16], [25], [26], [27] in contrast to studies from Spain and Japan were a significant association of *H. pylori* with male gender was seen [28], [29].

Recurrent abdominal pain is a common problem in pediatric patients [30]. In this study there is no association between *H. pylori* infection and RAP which consistent with the results of [30], [31], [32], in contrast to [33], [18] who reported an association between serologically high antibody titers of *H. pylori* IgG and abdominal pain. They suggest that high *H. pylori* IgG titers support active *H. pylori* infection. The same conclusion was made by [20] who reported a high degree of association between recurrent abdominal pain and *H. pylori* infection. We suggest that *H. pylori* infection is not the only cause of recurrent abdominal pain in children.

It has been demonstrated that acute infection with *H. pylori* can lead to hypochlorhydria [5], and so we postulated that *H. pylori* infection may predispose to diarrhea. Passaro and others in a retrospective study found that children with seropositive results for *H. pylori* had more and longer episodes of diarrhea the year after the acquisition of the infection than children who were not infected [34]. In this study there is no significant association between *H. pylori* infection and chronic diarrhea in between. In contrast to a study done in Gambia which find a positive association in between [5], [35], [36], no such association was found in another study conducted in Turkey [21], Nicaraguan [37], and Thailand orphanage children [38].

The relationship between *H. pylori* infection and vomiting was significant in this study in contrast to Marcello and [21] who found no significant correlation in between [21], [39]. But there is no specific symptom related with *H.pylori* infection [19].

Magnesium seems to be an important factor for both gastric acid secretion regulation and for *H. pylori* survival and virulence [6], [40]. The results of this study suggest the association of serum magnesium with the infection of *H. pylori*.

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