

Epidemiologic Serologic Survey of Helicobacter Pylori Infection Among a Child Population in Jeddah, Saudi Arabia

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ABSTRACT. Helicobacter pylori infection plays a definite role in the pathogenesis and recurrence of chronic gastritis and peptic ulcer disease. There is increasing evidence implicating it in the development of gastric lymphoma and adenocarcinoma. This study was designed to determine the prevalence of Helicobacter pylori infection in asymptomatic children in Jeddah. Serum was collected from 640 children and tested for the presence of Immunoglobulin antibodies to Helicobacter pylori using (HM-CAP), high molecular weight cell associated proteins Helicobacter enzyme immune assay, 10% of all patients were confirmed by Helicowestern-Blot 2.0 assay for positivity or negativity. The study shows that seropositivity increased significantly with increasing age, in Saudi children from 5% (1-2 years of age) to 29% (8-14 years old) and in non-Saudi children from 13.6 % (1-2 years old) to 50% (8-14 years old). However, there is no statistically significant difference in infection between males and females. Helicobacter pylori rate of infection in non-Saudi children is similar to those reported from poorly developed countries and in Saudi children is similar to those reported from some of the industrialized nations.

Keywords: Helicobacter pylori infection, Serology, Children, Saudi Arabia

Introduction

Within the last decade, there has been increasing recognition of the role of Helicobacter pylori (HP) among the disease of upper gastrointestinal tract. The spiral organisms

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were organisms recognized in the gastric mucosa nearly a century ago. It was not until 1983 that the relationship between type B gastritis and *Helicobacter* infection was identified [1-3].

Epidemiological data obtained among adults suggest that the actual colonization with HP be in fact determined by childhood factors^[4] and might predispose to duodenal ulcer^[5-7], chronic gastritis^[8, 9], atrophic gastritis^[10], and gastric carcinoma^[11-14].

Materials and Methods

The current study is a cross-sectional survey to determine the occurrence of HP infection among the pediatric population living in Jeddah, Saudi Arabia.

The participants of this study were children who were randomly selected from those attending outpatient clinics at both the King Abdulaziz University Hospital (KAUH) and the Maternity and Children's Hospital (MCH) in Jeddah during the periods of October, 1995 to July, 1996 and January to April, 1997. Eligible children were gastrointestinal symptom-free children, aged 1 to 14 years old.

The parents or guardians of the child participant and those children aged 8 years and older were fully informed about the study and a consent was taken.

A total of 3 cc samples of clotted blood was collected and the sera was evaluated for IgG antibodies using enzyme linked immune absorbent assay against the high molecular weight cell associated protein of *H. pylori* (HM-CAP. ELISA-H.P. sensitivity 98.7%, specificity 100%)^[15-17].

The validity of HM-CAP.ELISA-H.P. test was tested on 14 sera samples using a highly qualitative measure for the detection of IgG antibodies to HP (Helico Western-Blot 2.0 assay).

Odds ratio was used to determine the strength of association between the study outcome (*Helicobacter* infection) and any factor believed to influence its risk. Further, the 95% confidence bounds were determined to test whether the strength of association was statistically significant.

Various univariate analysis were used to assess the distribution of observations, to verify the appropriateness of statistical assumptions, and to provide an understanding of some of the relationships between the variables. The p of 5% level or less is used as the level of significance.

Results

A total of 638 children were randomly selected from all those attending the outpatient clinics at KAUH and MCH during the periods October, 1995 to July, 1996 and

January-April, 1997.

The demographic features of the study pediatric population shows the mean and standard deviation of age were 6 ± 2.4 years. Moreover, the Saudi children represented 86.6% of the participants, while the non-Saudis were only 13.4%. Almost 60% and 40% of the surveyed children were males and females, respectively.

Table 1 shows that the risk of infection was significantly influenced by age and nationality, whereas gender was not. Compared to children 1 - 2 years of age, the risk of infection significantly increased two-folds for those 3 - 7 years old (OR = 2.3, 95% C.I. 1.1 - 4.7), and almost five-folds for the children 8 - 14 years old (OR = 4.9, 95% C.I. 3.1 - 14.6). Moreover, non-Saudi children were 60% more at risk of the infection than their Saudi counterparts (OR = 1.6, 95% C.I. 1.1 - 2.3). The risk of infection was only 10% more among female children than male ones (OR = 1.1, 95% C.I. 0.8 - 1.5).

TABLE 1. Demographic features of the study's pediatric population.

Variable	Category	Total	Percent's Positives	Odds Ratio	95% Confidence Interval	P value
Age	1 - 2 years	122	6.6	1.0		
	3 - 7 years	328	14.9	2.3		
	8 - 14 years	188	31.9	4.9	3.1 - 14.6	0.00
Nationality	Saudi	554	17.2	1.0		
	Non-Saudi	86	26.7	1.6	1.1 - 2.3	0.03
Gender	Male	287	17.8	1.0		
	Female	253	19.4	1.1	0.8 - 1.5	0.62

Adjusting for nationality and gender, age remains a significant risk factor for HP infection. The percent of infection significantly increased from 5.0% among Saudi children aged 1 - 2 years old, 14.5% for those 3 - 7 years old to 29.0% for those aged 8 - 14 years old (Chi-square = 28.04, DF = 2, P = 0.000). Further, non-Saudi children aged 1 - 2 years old had a risk of infection of 13.6%, those 3 - 7 years old of 18.4%, and 50.0% for the children 8 - 14 years old (Chi-square = 10.45, DF = 2, P = 0.005).

For male children, the percentage of positive infection raised from 4.0% for those 1 - 2 years of age, 16.7% for those 3 - 7 years old, and 30.2% for the children 8 - 14 years old (Chi-square = 21.19, DF = 2, P = 0.000). On the other hand, the percentages of positive infections were 10.9%, 12.1%, and 34.2% for the female children 1 - 2 years old, 3 - 7 years old, and 8 - 14 years old (Chi-square = 18.00, DF = 2, P = 0.000), respectively.

Discussion

In 1983, Marshall and Marven^[1] reported the successful culture under a micro-aerophilic condition of a gram-negative bacterium from the antral mucosa of humans

with histopathological evidence of chronic active type B, gastritis subsequent studies confirmed HP as a major etiological factor in the development of type B gastritis, peptic ulcers, and gastric cancer^[1-5].

Epidemiological studies showed the infection to be more prevalent in the low social class. It is evident that there is marked differences in the prevalence of HP in children in different populations, its infection is increasing with increasing age, and it is more in developing countries than in developed nations^[19-31] (Table 2).

TABLE 2. HP infection in children in different countries.

Country	Up to 7 yrs	8 - 15 yrs	Reference
U.S.A		24.8%	Staat <i>et al</i> 1996
Italy	5.0 - 12.0%	13.0 - 23.0%	Odera <i>et al</i>
Belgium (Brussels)	5.0%	13.0%	Blecker <i>et al</i> 1992
Chile	23.0 - 28.0%	Up to 70.0%	Russel 1993
Brazil		34.0%	Oliveria <i>et al</i> 1994
Saudi Arabia (Riyadh)		40.0%	Al-Moagel <i>et al</i> 1990
Saudi Arabia (Jeddah)		18.3%	Jabber <i>et al</i> 1997

The overall prevalence of HP infection in this present study by serological assay is 18.31% of all children enrolled in the study. When we analyzed the results to determine the prevalence of infection in two-child population in Jeddah (Saudi and non-Saudi), 17% of the Saudi children are IgG positive which is closer to results published from industrialized countries in other parts of the world. If we review results from Italy 12% of children are serologically positive between 4 - 7 years, 13% positive at 8 - 11 years of age while its reaches 23% by 12 - 15 years old. In another study from Brussels, Belgium, positive serology was detected in 5% of children between 2 - 7 years old and increased to 13% in asymptomatic children by 8 - 13 years of age^[21-22].

The seropositivity in non-Saudi children is 26.7% and this is similar to reports from developing countries^[23, 24].

In a report from Brazil^[14], the overall prevalence of HP infection increased with age up to 64% at 15 years of age. In a study from Riyadh, Saudi Arabia, the prevalence of HP infection increased rapidly with age from 40% of those 5 - 10 years old to 70% at 20 years old^[26]. In the present study, the HP infection increased from 6.6% in 1 - 2 years old to 31.9% in 8 - 14 years old children. Other reports also showed similar results of increasing infection with increasing age which can be explained by repeated exposure^[21-26].

Non-Saudi children living in the Jeddah area showed 26.7% seropositivity to HP infection compared to 17.2% of Saudi children ($P = 0.003$). When we compared the age group 8 - 14 years old, seropositivity was 29.0% in Saudi children and 50% in the non-Saudi children. This difference could be attributed to socioeconomic status; crowd-

edness, race, place of birth, and intrafamilial transmission^[19-33].

At this time, the natural history and the consequences of infection in children are not clear. We need to determine the impact of early infection and the progress of symptoms to adult life, so we can highlight children at risk to develop chronic gastritis, peptic ulcer disease, and gastric carcinoma.

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مسح شامل لوباء وأمصال العدوى الناجمة عن بكتريا « هليكوباكتر بايلوري » بين الأطفال بجدة، بالمملكة العربية لسعودية

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المملكة العربية السعودية

المستخلص . تلعب العدوى بالملوية البوابية دوراً واضحاً في أمراض
ورجعة (نكسة) التهاب المعدة المزمن وداء القرحة الهضمية . هناك
دليل متزايد على تورط هذه العدوى في نشوء (الورم اللمفوي)
والسرطانة الغدية المعديتين . أعدت هذه الدراسة لتحديد معدل انتشار
العدوى بالملوية البوابية عند الأطفال العددي الأعمار في جدة و جمع
المصل من ٦٤٠ طفلاً واختبر للتحري عن وجود أضداد الغلوبولين
المناعي أي ج ج المضادة للملوية البوابية باستعمال المقايسة المناعية لإنزيم
الملوية للبروتينات المرتبطة بالخلية المرتفعة الوزن الجزيئي ، وتم توكيد
١٠٪ من جميع الأطفال بواسطة مقايسة هليكوباسترن - بلوت ، ٢٠
من أجل تأكيد الإيجابية أو السلبية . بينت الدراسة أن إيجابية المصل
ازدادت عند الأطفال السعوديين من ٥٪ في الأعمار المتراوحة بين سنة
واحدة وستين إلى ٥٠٪ في الأعمار المتراوحة بين ٨ سنوات و ١٤ سنة .
ومن ناحية ثانية لم يكن هناك فرق ذو أهمية إحصائية في العدوى بين
الذكور والإناث كان معدل العدوى بالملوية البوابية عند غير السعوديين
مشابهاً لذلك المبلغ عنه من الدول النامية ، في حين كان عند الأطفال
السعوديين مشابهاً لذلك المبلغ عنه من الدول الصناعية .