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ORIGINAL ARTICLE

CagA *Helicobacter pylori* Seropositivity in Asymptomatic, Apparently Healthy, Young Adult Egyptian Food Handlers

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ABSTRACT

Background/Aim: Infection with CagA *Helicobacter pylori* (*H. pylori*) positive strain is a risk factor for the development of atrophic gastritis and gastric adenocarcinoma. This study investigated the seroprevalence of *H. pylori* and its virulent strains CagA in Egyptian food handlers.

Subjects and methods: A total of 365 eligible male subjects participated in the initial study. Venous blood samples were collected from all participants for assessment of *H. pylori* specific IgG and serum CagA antibodies.

Results: Out of 365 subjects, 310 were reactive to *H. pylori*. Out of them, CagA was detected in 143 *H. pylori*-infected subjects. CagA antibodies were more common in cigarette smokers (< 0.001), living in high crowding index (< 0.001), with low family income (< 0.01) and sharing their bedrooms during childhood (< 0.001).

Conclusion: Our data revealed a high prevalence of CagA virulent strains among asymptomatic apparent food handlers of Egypt. Emergency surveillance mechanisms should be developed for containment of *H. pylori* infection in Egypt.

Abbreviations: *H. pylori*: *Helicobacter pylori*; CagA: Cytotoxin associated gene A.

Keywords: Cytotoxin-associated gene A, *H. pylori*, Egyptian food handlers.

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INTRODUCTION

Helicobacter pylori (*H. pylori*) is a Gram-negative, spiral, microaerophilic bacterium that resides in a neutral microenvironment between the mucus and the superficial epithelium of the stomach.[1] This microorganism infects the stomach of more than 50% of the human population worldwide and is responsible for upper gastrointestinal diseases in humans, including gastritis, gastric ulcer, duodenal ulcer, gastric adenocarcinoma and gastric B-cell lymphoma.[2] In developing countries, the prevalence of this infection can be as high as 80%.[3] CagA (a product of CagA gene) is one of the most important putative virulence factors of *H. pylori* and contributes to the developing different *H. pylori* related outcomes in Western countries[4] and infection with a CagA-positive strain is a risk factor for the development of atrophic gastritis[5] and gastric adenocarcinoma.[6] However, little is known about *H. pylori* local demographic characteristics. Therefore, the aim of this study is to investigate the seroprevalence of *H. pylori* and its virulent strains CagA and their possible related risk factors among food handlers from Egypt.

SUBJECTS AND METHODS

Subjects were randomly selected among food handlers recruiting at the Mansoura local Ministry of Health during periodic health assessment in 2010. We started with 407 males and 127 females. All answered the study questionnaire and performed physical measurements. Forty-two males and all females refused to give blood sampling and were excluded from the study. Subjects gave a written consent to participate in the initial study and the subsequent *H. pylori* serology. They were no recent history of alcohol consumption, or any drugs or medications during the last 2 months. Thus, nonfasting venous sample was collected from 365 male participants and stored at –20°C for subsequent analysis.[7]

The titers of *H. pylori* were estimated by an ELISA kit (Premier, Meridian Diagnostics, Cincinnati, Ohio, USA). The assessment of CagA antibodies were accomplished in the sera using recombinant CagA antigen, or v220.[6] The assay of CagA had 92% sensitivity and 96% specificity that was preevaluated in 62 patients from another studying whom the CagA status was assessed directly by western blot in gastric biopsy specimens (Helicoblot 2.0, Genelabs Diagnostics, Singapore). This level of accuracy is comparable with that described for the original serological assay.[6]

Univariate analysis was performed for all variables to ascertain significance as predictive factors of *H. pylori* infection using Pearson's Chi-square test for categorical and ordinal variables and t-test for continuous variables. Results <0.05 were considered to be statistically significant. Data analyzes were performed using SPSS 15.0 (SPSS, Chicago, IL, USA).

RESULTS

A total of 365 asymptomatic male subjects (age; 21-39 years), were enrolled in this study. All of them were

asymptomatic. Of them 55 (11.28%) subjects were tested negative and 310 (88.72%) were positive for *H. pylori* antibodies. CagA antibodies were positive in 143 (46.13%) of those tested positive for mixed antigen *H. pylori* (Tables 1 and 2).

Epidemiological study revealed that *H. pylori* was more common in men of rural origin (60.4 *vs* 29.99%, $p < 0.001$), current smokers ($p < 0.05$), people of low socioeconomic standard, and comparatively lower educational level ($p < 0.001$). *H. pylori* was also prevalent in persons who shared bed in childhood ($p < 0.001$) and high lived in places with crowding index ($p < 0.001$) (Table 1).

CagA antibodies were more common in cigarette smokers (< 0.001), living in high crowding index (< 0.001), with low family income (< 0.01) and sharing their bedrooms during childhood (< 0.001).

As shown in Table 2, CagA seropositivity was more among those of urban origin (< 0.05) and the educated group (< 0.01) (Table 2). Urban inhabitants admitted that 27/40 (67.5%) of them lived for years in their early life in a rural area and 41/67 (61.19%) of those well educated worked at least 1 year in an obligatory governmental service in distant villages.

Understanding the potential pathogenicity of CagA-positive strains, 7/143 (4.89%) asymptomatic subjects performed upper gastrointestinal endoscopy. The data revealed that all of them had apparently normal gastric mucosal in macroscopic view, but, all of them had chronic superficial gastritis on histopathological examination.

DISCUSSION

Infection with *H. pylori* occurs worldwide, but the prevalence varies greatly among countries and among population groups within the same country.[8] *H. pylori* infection is quite common, even among asymptomatic individuals. It occurs in about 10% of healthy individuals younger than age 30, and in nearly 60% of those overage 60.[9]

This study revealed that only 11.27% were tested negative while the remaining subjects (88.73%) were tested positive for mixed *H. pylori* antigens. This high prevalence is probably common in the developing countries as Brazil

Table 1: Possible risk factors with *H. pylori* positivity in the studied subjects

Possible risk factor	*All H. pylori positive (310)*	*All H. pylori negative (55)*
Place of birth		
Urban	109 (39.6%)**	39 (70.01%)
Rural	201 (60.4%)**	16 (29.99%)
Current smoker	120 (30.83%)*	27 (49.99%)
BMI	25.2	25.3
Adult socioeconomic factors		
Car owner	109 (39.6%)**	40 (72.72%)
Home owner	212 (68.38%)	42 (76.33%)
Married	170 (54.83%)	31 (50.65%)
Occupation in high social class	25 (8.06%)**	38 (69.09%)
Possession of pets	28 (9.03%)**	3 (5.45%)
Annual family income		
<3000 Egy pounds	69 (22.26%)**	51 (92.73%)
≥3000 Egy pounds	241 (77.74%)**	4 (7.27%)
Municipal water	310 (100%)	55 (100%)
Adequate sewage disposal	305 (98.38%)	55 (100%)
Crowding index		
<1	5 (1.62%)**	42 (76.33%)
>1	305 (98.38%)**	13 (23.67%)
Educational level		
Lack of schooling	15 (4.93%)**	0 (0%)
Elementary	85 (20.97%)**	0 (0%)
Medium—High	210 (63.1%)**	55 (100%)
Childhood socioeconomic factors		
Shared bedroom	80 (25.81%)**	5 (90.99%)
Hot water tap in the house	210 (63.1%)**	55 (100%)
Bathroom in the house	310 (100%)	55 (100%)
Family owned a car	5 (1.62%)**	29 (54.54%)
Father with nonmanual job	38 (12.29%)**	44 (80%)
Crowding index		
<1	2 (0.65%)**	25 (45.41%)
>1	308 (99.35%)**	30 (54.59%)
Possession of pets	15 (4.93%)	3 (5.45%)

*p-value < 0.05; **p-value < 0.001

where the prevalence of *H. pylori* infection is as high as 80%.[3] Low socioeconomic status, poor hygiene, inadequate sanitation and household overcrowding are associated with prevalence of *H. pylori* infection with no gender difference.[8]

Our data revealed that *H. pylori* was more common in men of rural origin ($p < 0.001$), current smokers ($p < 0.05$), low socioeconomic standard, low educational level ($p < 0.001$) and with shared bedrooms ($p < 0.001$) during their childhood and high crowding index ($p < 0.001$) (Table 1).

Improvement in hygiene and living conditions have resulted in less prevalence of *H. pylori* infection;[10] a statement describing the situation in the *H. pylori* sero-negative subjects in this study.

H. pylori CagA-positivity is associated with severe disease symptoms and a higher risk of ulcerations, mucosal atrophy and gastric adenocarcinoma.[5,6] *H. pylori* CagA-seropositivity was found in 46.13% of the participants in this study and was more common among cigarette smokers ($p < 0.001$), those living in crowded houses ($p < 0.001$), with low family income ($p < 0.01$) and those were sharing their bedrooms during childhood ($p < 0.01$).

CagA-positive strains increase the expression of the nuclear factor κB and stimulate the release of interleukin-8; a cytokine that plays a central role in the pathogenesis of *H. pylori* gastritis.[11] This study revealed that 7/7(100%) asymptomatic CagA-positive subjects had chronic superficial gastritis when upper endoscopy was performed. This finding would alert physicians about this silent pathology and other potential risks, related to CagA strains, especially if become progressive without alarming symptoms.

Epidemiological studies suggest person-to-person transmission, by either fecal-oral or oral-oral routes, to be the major mechanism for *H. pylori* transmission. In developing countries, there is evidence for both food- and water-borne transmission of *H. pylori*. Intrafamilial spread appears to play a central role in transmission of the infection in both developing and developed countries.[12] It is generally believed that once *H. pylori* infection occurs, it commonly persists throughout life unless treated.[13] This study found that significant CagA-positive subjects reported bedroom sharing during childhood more than CagA-negative ones; a data consistent with suggestions that potentially virulent

Table 2: Possible risk factors with CagA-positivity in the studied subjects

Possible risk factor	*CagA-positive (143)*	*CagA-negative (167)*
Place of birth		
Urban	40 (27.97%)*	69 (41.32%)
Rural	103 (63.03%)	98 (58.68%)
Current smoker	88 (73.33%)**	32 (26.67%)
BMI	25.3	25.4
Adult socioeconomic factors		
Car owner	29 (16.67%)**	80 (47.9%)
Home owner	98 (68.53%)	114 (68.26%)
Married	73 (51.05%)	97 (58.08%)
Occupation in high social class	9 (6.29%)	17 (10.18%)
Possession of pets	10 (6.99%)	18 (10.22%)
Annual family income		
<3000 Egy pounds	18 (12.58%)**	51 (28.98%)
≥3000 Egy pounds	91 (63.64%)	150 (85.22%)
Treated water	143 (100%)	167 (100%)
Adequate sewage disposal	138 (96.5%)	167 (100%)
Crowding index		
<1	1 (0.67%)	4 (2.3%)
>1	142 (99.33%)**	163 (97.6%)
Educational level		
Lack of schooling	6 (4.19%)	9 (5.11%)
Elementary	39 (27.27%)	46 (26.14%)
Medium—high	67 (46.85%)*	133 (79.64%)
Childhood socioeconomic factors		
Shared bedroom	62 (43.36%)**	18 (10.78%)
Hot water tap in the house	97 (56.07%)*	113 (67.66%)
Bathroom in the house	134 (100%)	167 (100%)
Family owned a car	2 (1.39%)	3 (1.79%)
Father with nonmanual job	17 (11.89%)	21 (12.57%)
Crowding index		
<1	1 (0.69%)	1 (0.59%)
>1	142 (99.31%)	166 (99.41%)
Possession of pets	12 (8.39%)*	3 (1.79%)

*p-value < 0.05; **p-value < 0.001

H. pylori strains may be acquired during childhood than other strains.[14]

Interestingly, CagA-seropositivity was found more in people of urban origin (< 0.05), and also among the educated group ($p < 0.01$) (Table 2). Detailed interrogation of the urban inhabitants revealed that 27/40 (67.5%) subjects lived for few years in their childhood in a rural area and 41/67 (61.19%) of those well-educated persons worked at least 1 year in an obligatory governmental service jobs in distant villages with great possiblities of acquiring *H. pylori* infection there. The remaining CagA-positive subjects (22.5%) of the former and 38.81% of the latter, probably acquired *H. pylori* infection during their adulthood. Therefore, it can be suggested that there is continuous chance of acquiring *H. pylori* infection, but with a lower risk in adults with high socioeconomic class in endemic areas.

Our data revealed a high prevalence of *H. pylori* infection and its CagA virulent strains in the studied subjects. Continuous chance of acquisition *H. pylori* infection, but with a lower risk in adults with high socioeconomic class in endemic areas, is suggested. Improvement in hygiene and living conditions for a lesser prevalence of *H. pylori* infection is advised.

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