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Original Article

Lipid Profile in Subjects with *Helicobacter pylori* Infection

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ABSTRACT

Background and Objectives: **Helicobacter pylori cause a chronic gastric infection, and may cause extra gastrointestinal disease. The association between *H. pylori* infection and serum lipid profiles is still controversial. The aim of this study was to investigate any possible relationship between *H. pylori* infection and lipid levels.**

Materials and Methods: **The subjects were 400 volunteer referring to medical centers of Kashan, Iran between December 2005 and March 2006. *Helicobacter pylori* infection status was determined by assaying serum anti-*H. pylori* immunoglobulin G antibody. Total cholesterol, HDL-cholesterol, triglyceride concentrations were measured by routine enzymatic methods. The data for *H. pylori*-seropositive and –seronegative individuals were compared.**

Results: **Three hundred nineteen subjects (79.8 percent) were *H. pylori*-seropositive. The serum triglyceride concentration and total cholesterol/HDL-cholesterol ratio were significantly higher in *H. pylori*-seropositive than *H. pylori*–seronegative individuals (162.03 vs. 143.88 mg/dl, $P<0.05$ and 4.27 versus 3.91, $P<0.05$ respectively).**

Conclusion: **The findings confirm the existence of a moderate association between *H. pylori* infection and lipid modulation. It is also possible that *H. pylori* infection promotes atherosclerosis by acting through changes in lipid profile.**

Key words: *Helicobacter pylori*, Lipid Profile, Coronary Heart Disease, Atherosclerosis, Serum Lipid Levels

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Introduction

Helicobacter pylori infection is the most common chronic bacterial infection in the world. This bacterium colonizes the human stomach and causes chronic and active gastritis, peptic ulcer disease and is associated with increased risk of developing gastric cancer (1-2).

Several studies have suggested that *H. pylori* infection can be involved in the pathogenesis of some extra digestive disorders, and cardiovascular disease is one of them (3-5). There are several hypotheses to describe the mechanisms of this relationship with direct or indirect effects. *H. pylori* is a bacterium with effects like endothelial injury, smooth muscle proliferation, and local inflammation on the vascular wall (6). This bacterium has also indirect effects as proinflammatory, procoagulant, and atherogenic action; these can change risk factors (lipid profile, coagulation, levels of oxidative metabolites), produ-ction of crossreactive antibodies, malabsorption of nutrients and vitamins, and metabolic factors such as overproduction of ammonia (6).

Various studies have shown a positive correlation between *H.pylori* infection and the risk of cardiovascular disease, whereas the others have not confirmed these findings (7-10). Acute and chronic infections causing the inflammation of arteries may promote the atherosclerotic cascade (11). *H. pylori* induces along standing low-grade persistent inflammation stimulus. Some studies have indicated that *H. pylori* infection can modify the serum lipids concentration (7) being also associated with an atherogenic lipid pattern (12, 13), while the other studies have not found such a relationship (14, 15).

Based on these considerations, the present study was designed to investigate whether *H. pylori* infection is also associated with changes in lipid profile.

Materials and Methods

Four hundred healthy asymptomatic volunteers (mean age 38±12 yr, range 11-83 yr, 235 males, 165 females) were included in the study. Subjects were enrolled from Kashan medical centers between December 2005 and March 2006. The majority of people who attended were working, socioeconomically middle class. Individuals with a history of indigestion or gastrointestinal disease were not included in this study. Patients with cardiovascular disease, diabetes mellitus, familial hypercholesterolemia and hypertriglyceridemia and liver disease were also excluded. After obtaining written informed consent for the study, which was carried out in accordance with the Helsinki Declaration, a precise medical history was taken .Hematological and biochemical blood tests were performed in the laboratory. Blood samples taken after overnight fasting, were centrifuged and the sera were frozen at -20°c, and then used for quantitative analysis. Triglyceride, total cholesterol, and high-density lipoprotein cholesterol (HDL-cholesterol) concentrations were measured by routine enzymatic methods using commercial kits. Levels of low-density lipoprotein cholesterol (LDL-cholesterol) were calculated by Friedwald formula. Seroprevalence of *H. pylori* was determined by measurement of the serum anti-*H. pylori* IgG antibody using an ELISA (IgG, EIA, Trinity Biotech, USA). According to the manufacturer's instruction, ISR≥ 1.1 was regarded as positive.

Statistical analysis

Results are reported as mean ± standard deviation (SD) for normally distributed continuous variables, median (minimum–maximum) for skew distributed continuous variables, and frequencies for categorical variables. Comparisons between groups were carried out using the unpaired two-tailed student's *t*-test, $\chi 2$ test to compare between individuals seropositive and seronegative for H. pylori. Data analysis was performed by using the Statistical Package for Social Science (SPSS for Windows, version 10.0, 1999, SPSS Inc, Chicago, IL). Differences at $P< .05$ were considered statistically significant. All P values are 2-tailed.

Results

The subjects were divided into 319(79.8%) *H. pylori* seropositive and 81(20.2%) seronegative individuals**,** as shown in Table I .The significant differences were observed between infected and uninfected subjects as regards age: *H. pylori* seropositive subjects were older the *H. pylori* seronegative subjects with 39.9±12.6 yr and 30.6±11.8 yr as mean as standard deviation, respectively ($P<0.0001$). The seropositive group had a statistically higher male: female ratio than the

seronegative group (1.59 vs. 0.92, $P<0.05$). Mean triglyceride in *H. pylori* seropositive and seronegative individuals were 162 and 143.9 mg/dl, respectively ($P<0.05$). The geometric mean ratio of total cholesterol to HDL-cholesterol was significantly higher in the *H. pylori* seropositive than seronegative cases (4.27 vs. 3.91, $P<0.05$). Total cholesterol and LDL- cholesterol were higher in *H. pylori* seropositive individuals than *H. pylori* seronegative, but these differences were not significant (Table 2).

Table 1: Characteristics in *H. pylori* Seropositive and seronegatives

	***H. pylori* seropositive**	***H. pylori* seronegative**	***P*-value**
n	319	81	
Age(year)(SD)	39.9±12.6	30.6±11.8	<0.0001
Male: Female	196:123	39:42	0.04

Numbers are mean±SD

Table 2: Serum lipid concentrations in *H.pylori* seropositive and seronegative subjects.

	Serological test of *H. pylori*		
	Positive	**Negative**	***P*-value**
CH (mg/dl)	170.89±40.05	162.01±39.26	NS*
TG (mg/dl)	162.03±71.43	143.88±79.25	0.04
HDL-CH (mg/dl)	41.87±10.41	43.63±10.32	NS
LDL-CH (mg/dl)	96.62±33.87	89.65±32.54	NS
CH/HDL-CH	4.27±1.24	3.91±1.3	0.02
LDL-CH/HDL-CH	2.43±0.98	2.19±0.98	NS

*Not Significant

Data are reported as mean± SD

CH: total cholesterol; TG: triglyceride; HDL-CH: HDL-cholesterol; LDL-CH: LDL-cholesterol; CH/HDL-H: total cholesterol/HDL-cholesterol ratio; LDL-CH/HDL-CH: LDL-cholesterol/HDL-cholesterol ratio.

Discussion

In the present study, we found that prevalence of *H. pylori* was 79.8% and HDL-C level was lower in *H. Pylori* serpositive than seronegative cases. Some studies have demonstrated a relationship between *H. pylori* infection and extra digestive disease (3, 5). In this respect, cardiovascular disease is one of the most important disease suggested to be related to *H. pylori* infection which maybe due to effect of infection on lipid metabolism (78-, 16-18). Since some studies have shown that, the association might be in directed and related to social class (9, 16). Our study population including males and females were in a relatively small area in center of Iran (Kashan). The social conditions of the population were almost homogeneous so that the chances of indirect relationship in social groups' differences are not possible (16). According to our results, the prevalence of *H. pylori* was 79.8%. One study in northwest of Iran, a region with the highest mortality rate from gastric cancer throughout the country, reported that *H. pylori* infection occurs in 89.2% (883/990) of the residents (19). Other surveys in different age groups from various regions of the country reported that *H. pylori* infection occurs in 57%-91% of the study subjects (20-23). Our findings

indicated that, *H. pylori* infection modified serum lipids. Indeed, the serum triglyceride level was found to be higher in *H. pylori* seropositive than in negative ones. Although the levels of serum total cholesterol and LDL-cholesterol are increased in *H. pylori* positive, but these differences are not significant. The data also suggest a negative, although not statically significant, effect of *H. pylori* positivity on plasma HDL-cholesterol concentration. Concerning the changes in serum lipids in *H. pylori* positive subjects, the results of our study are similar but not identical to those of studies from other countries (8, 17, 18, 24). Laurila *et al.* reported that the serum triglyceride and total cholesterol concentrations were significantly higher in the males with positive IgG and IgA antibody titres for *H. pylori* than in the males with no signs of infection (16). In addition, Adachi *et al.* reported that after adjustment for sex, age, and drinking habits, the HDL-cholesterol levels of seropositive and seronegative groups differed markedly (24). These differences in the influence of *H. pylori* infection on serum lipids may be caused by different genetic factors of people from other countries and the subjects in the present study.

Previous studies have indicated that serum triglyceride and HDL-cholesterol levels can change during the acute phase of bacterial infection (15, 25). These alterations promote atherogenesis, which have been attributed to the action of bacterial lipopolysacchride (LPS) (15). Volanen *et al.* expressed that the administration of endotoxin (LPS) induces the production of several cytokines, such as tumor necrosis factor (TNF-α) which increases serum triglyceride level in animals (15). They have also suggested that changes in lipid profile seem to be related to the production of inflammatory cytokines by cells chronically infected with Gram-negative bacteria such as *H. pylori* (15).

Conclusion

Upon our results, infected subjects show ed an atherogenic profile characterized by an increase in total cholesterol: HDL-cholesterol ratio compared to uninfected subjects. This ratio, represent an absolute value indicating a predisposition to atherosclerotic processes and it is recognized as a reliable indicator for assessment of coronary heart disease risk (13,18).

In conclusion, our data confirm the existence of a moderate association between *H. pylori* infection and lipid modulation. It is also possible that *H. pylori* infection promotes atherosclerosis by acting through changes in lipid profile. However, maybe other cofactors are involved in the lipid modulation along with the strain of *H. pylori* including host genetic and environment factors.

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