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Original Research Article

Is there an association between Helicobacter pylori infection and alteration of lipid and glucose serum levels after elimination of secondary causes?

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Helicobacter pylori **colonizes the stomachs of 50% of the world's human population throughout their lifetimes. Recent research has focused on whether *H. pylori* colonization is a risk factor for some extragastric diseases. This infection may disturb glucose and lipid metabolism in a way that may increase the risk of atherosclerosis. The aim of this study was to assess the association between *H. pylori* infection and metabolic parameters. This cross-sectional study surveyed anti *H. pylori* IgG antibodies in 132 healthy check-up subjects in 2015; 125 subjects (43 men and 82 women, age 20–59 years) fulfilled the inclusion criteria. Metabolic parameters were determined by routine blood tests and Body Mass Index (BMI) was also calculated. 68 patients (54.4 %) had serum antibodies to *H. pylori*. The group (n = 68) of subjects with positive serology for *H. pylori* differed from the group without positive serology (n = 57) in age (P value <0.03). No significant difference was observed regarding the other parameters such as glucose, lipid and body mass index. Our results are in agreement with those of some studies that had tried to eliminate confounding factors. Subjects with positive serology for *H. pylori* are characterized by greater age. If confounding factors are taken into account, most authorities consider the associations between *H. pylori* infection and metabolic parameters to be non-causal.**

Key words: *Helicobacter pylori*, glucose, serum lipid, BMI, metabolic parameters.

Abbreviations: BMI: body mass index, FBS: fasting blood sugar, HDL: high-density lipoprotein, *H. pylori*: *Helicobacter pylori*, LDL: low-density lipoprotein, TC: total cholesterol, TG: triglyceride.

INTRODUCTION

Helicobacter pylori colonizes the stomachs of 50% of the world's human population throughout their lifetimes. Colonization with this organism is the main risk factor for peptic ulceration as well as for gastric adenocarcinoma and gastric MALT lymphoma. Treatment for H. pylori has revolutionized the management of peptic ulcer disease, providing a permanent cure in most cases. Such treatment also represents first-line therapy for patients with low-grade gastric MALT lymphoma (Danis et al., 2015). Recent research has focused on whether H. pylori colonization is a risk factor for some extragastric diseases and whether it is protective against some recently emergent medical problems, such as atherosclerotic vascular diseases (Elena et al., 2014; Murray et al., 1995; Niemela et al., 1996; Kanbay et al., 2005 and Jia et al., 2009). Atherosclerosis is a multifactorial disease, in which inflammation and lipid

Table 1. *H. pylori* infectious status, age and metabolic parameters considered

Variable	Seropositive	Seronegative	P value
Age	39.2 ± 9.2	29.45 ± 9.1	0.039
BMI	24 ± 3.5	24.17 ± 3.42	0.787
TC	188.14 +- 43.8	179.66 ± 35.9	0.237
LDL	111.13 ± 33.33	106.24 ± 27.1	0.368
HDL	52.61 ± 13.02	51.29 ± 12.15	0.560
TG	112.89 ±72.78	114.21 ± 74.64	0.921
FBS	97.52 ± 10.88	94.66 ± 12.24	0.174

disorders play an important role. *H. pylori* infection may disturb glucose and lipid metabolism in a way that may increase the risk of atherosclerosis. Some studies have shown *H. pylori* infection to be associated with diabetes mellitus, but the relationship remains controversial (Elena et al., 2014; Zhou et al. 2013). The observation that *H. pylori* infection may affect lipid profile was first made by Murray et al. (1995) who reported reduced HDL-C levels in serum samples of *H. pylori*-infected women. Elena et al. (2014) reported that the lower the mean percentage of fat mass and level of HDL the higher the mean glucose concentration in patients with anti-*H. pylori* serum IgG than in uninfected patients. They did not find any significant difference in the other parameters such as LDL, TG and BMI.

Zhou et al. (2013) reported a trend toward more frequent *H. pylori* infections in diabetes patients, especially in type 2 diabetes patients. Niemela et al. (1996) reported that patients who were *H. pylori* positive had significantly higher concentrations of serum triglycerides and lower concentrations of HDL cholesterol than in those who were negative; among both cases and the controls. Azuma et al. (2002) reported that there was no significant difference in body weight, BMI or serum total cholesterol level between the *H. pylori*-positive and -negative groups. However, after eradication therapy of *H. pylori*, BMI increased significantly yet serum total cholesterol levels did not change. Review of mentioned articles shows that there is no consensus on the relationship between *H. pylori* infection and changes in metabolic parameters. The aim of the present study was to assess the association between *H. pylor*i infection and metabolic parameters and whether the overall *H. pylori* infection could alter metabolic parameters and BMI in patients who visited for routine health check-up.

METHODS

This is a cross-sectional single-center study of adult subjects aged 20 years or older who visited for routine health check-up in 2015. The study was performed in Tehran, Iran and included residents of an urban area. Written consent was obtained from all participants prior to their inclusion in the study. Subjects eligible for this study were 132 adult men and women. For all subjects, a detailed medical history was obtained including smoking habit and alcohol consumption. In addition, height and weight were measured in a standardized fashion, with BMI calculated as weight in kilograms divided by the square of height in meters. In all subjects renal, liver and thyroid functions were checked. Excluding criteria were: previous or ongoing treatment for *H. pylori* infection, severe hyperlipidaemia (TC >300mg/dL) or severe hypetriglyceridemia (TG >500mg/dL), severe obesity (BMI >40), history of smoking , alcohol abuse, pregnancy, diabetes mellitus, hypo or hyperthyroidism, chronic renal failure, nephrotic syndrome, cholestasis or hepatic failure, and those receiving therapies (steroids, levothyroxine, estrogens, diuretics, amiodarone, beta blocker except carvedilol, calcium channel blockers, cyclosporine, tacrolimus, sirulimus, raloxifen, anti-retroviral drugs; and asthma medications such as theophylline, beta2-agonists and anti-cholinergics).

125 patients (43 men and 82 women, age 20–59 years) fulfilled the inclusion criteria. In all subjects, blood samples were obtained from the antecubital vein in the morning after 12 h overnight fasting. Serum samples were separated after centrifugation for measurement of serum cholesterol, triglyceride and fasting glucose levels. *H. pylori* infection status was determined serologically using a commercially available enzyme-linked immunosorbent assay (ELISA) with high sensitivity and specificity.

Statistical analyses

All values were expressed as mean ± SD. All tests were performed using the SPSS statistical package for Windows version 16.0. T test was used to compare the differences between subject groups. All tests were done two-sided, and $P<0.05$ was considered statistically significant.

RESULTS

Out of the 125 patients examined (43 men and 82 women; age range 20–59 years), 68 patients (54.4%; 23 men and 45 women) tested positive for anti-*H. pylori* IgG antibodies. Comparism of patients with and without positive serology for *H. pylori* in terms of quantitative variables are presented

in Table 1. The difference between the patients with and without *H. pylori* serology was significant only in terms of age (t- test; P<0.039).

DISCUSSION

The interest for a possible role of *H. pylori* in the occurrence of some extragastric diseases especially atherosclerosis seems to remain strong. Some studies have revealed an association between *H. pylori* infection and metabolic parameters (Elena et al., 2014; Niemela et al., 1996; Jia et al., 2009), but other studies have not confirmed these connections (Ekesbo et al.,2000: Azuma et al., 2002; Kanbay et al., 2005).

Ekesbo et al. (2000) reported that the seropositive group also differed in terms of fasting levels of insulin (12.7 vs. 11.6 pmol/l; P < 0.05), but this difference did not remain significant after adjustment for age and BMI. They detected no intergroup difference in blood pressure and glucose and lipids levels.

In our study, all the subjects had no acute clinical illness and all secondary causes of dyslipidaemia which may influence lipid metabolism were excluded from the study. Subjects had no dyspepsia so ethically, they did not require eradication of *H. pylori*.

The analyses showed that the difference between the groups with and without *H. pylori* infection in terms of metabolic parameters were not significant. Our results are in agreement with those of some studies that had tried to eliminate confounding factors (Azuma et al., 2002; Kanbay et al., 2005).

Kanbay et al. (2005) did not find any significant difference in LDL, TC, or TG serum levels between the two groups. Nevertheless, *H. pylori* was eradicated in the seroposetive group. Although CRP and HDL serum levels were found to be the same before and after treatment in the seronegative group, CRP levels were found to decrease and HDL levels to increase significantly in the seropositive group (P <0.05). They concluded that *H. pylori* infection may affect lipid metabolism in a way that could increase the risk of atherosclerosis.

Jia et al. (2009) reported that *H. pylori* infection is associated with decreased serum levels of high density lipoprotein, but not with the severity of coronary atherosclerosis. Their study was conducted only in patients with coronary atherosclerosis and they did not pay attention to the effect of drugs on lipid profile. Although our study tried to eliminate all effective drugs on serum lipids, Elena et al. (2014) reported that the lower the mean percentage of fat mass and level of HDL, the higher the mean glucose concentration in patients with anti-*H. pylori* serum IgG than in uninfected patients. They did not detect any significant difference in the other parameters such as LDL, TG and BMI and did not exclude subjects who had severe hyperlipidemia (TC >300 mg/dL) or severe hypetriglyceridemia (TG >500 mg/dL) as familial dyslipidemia. Perhaps, this is due to differences between our results and their results. Niemela et al. (1996) reported that, patients who were *H. pylori* positive had significantly (P = 0.03) higher concentrations of serum triglycerides and lower concentrations of HDL cholesterol than in those who were H. pylori negative, among both the cases and the controls. They did not exclude Subjects who had sever hyperlipidemia or sever hypetriglyceridemia from the study and did not check renal, liver and thyroid functions as secondary causes of hyperlipidemia. This may account for the difference in results between the current study and their results.

In this study, no association was found between *H. pylori* infection and alteration of lipid and glucose serum levels after elimination of secondary causes.

Conclusion

Subjects with positive serology for *H. pylori* are characterized by greater age. If confounding factors are taken into account, most authorities consider the associations between *H. pylori* infection and metabolic parameters and BMI to be non causal. Further studies are needed to verify these findings.

Conflicting interests

All authors declare that they have no conflict of interest.

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