RESEARCH ARTICLE

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Association between *Helicobacter pylori* Infection and Cardiovascular Risk Factors among Patients in the Northern Part of Afghanistan: a Cross-Sectional Study in Andkhoy City

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Abstract

Background: The association between *Helicobacter pylori* infection and cardiovascular risk factors remains controversial. The high prevalence of *H. pylori* infection among Afghan patients warranted the investigation of this association. The aim of the present study was to determine the association between *H. pylori* infection and cardiovascular risk factors among patients visiting an outpatient clinic in Andkhoy, Afghanistan. **Methods:** We performed a cross-sectional study of 271 consecutive patients in an outpatient clinic in Andkhoy, Afghanistan from April 2017 to June 2017. The diagnosis of *H. pylori* infection was achieved using an enzyme-linked immunosorbent assay test. The patients were divided into *H. pylori* positive (n=189) and *H. pylori* negative (n=82) groups. The association between *H. pylori* infection and cardiovascular risk factors was analyzed. **Results:** Of the total 271 study participants, 102 (37.6%) were male and 169 (62.4%) female. The mean age ± standard deviation of the patients who were *H. pylori*-positive and *H. pylori*-negative was 51.0 ± 17.6 years and 51.6 ± 17.6 years, respectively. In multivariate logistic regression analyses, *H. pylori* infection was significantly associated with diabetes mellitus (DM) (odds ratio [OR] 3.16, 95% confidence interval [CI] 1.31-7.62, P = 0.011), and body mass index (BMI) levels (OR 1.17, 95% CI 108-1.26, P < 0.001). **Conclusions:** Our study indicated that *H. pylori* infection was significantly associated with DM and elevated BMI levels in patients from an outpatient clinic in Andkhoy, Afghanistan. More aggressive measures, including DM, obesity control, and *H. pylori* eradication are needed.

Keywords: *H. pylori*- cardiovascular risk factors- Andkhoy- Afghanistan

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Introduction

Helicobacter pylori is one of the most common human infections worldwide, and about 50% of the global population is infected with this bacteria (Chmiela et al., 2017; González-Pons et al., 2018). *H. pylori* infection has been identified as one of the main cause of gastritis, peptic ulcer disease, and it is a known risk factor for gastric malignancy (Y et al., 2014; Goto et al., 2016; Nagy et al., 2016; Raei et al., 2016; Hooi et al., 2017; Vilaichone et al., 2017). The prevalence of *H. pylori* infection worldwide differs by geography, age, race, ethnicity and socioeconomic factors (Abebaw et al., 2014). *H. pylori* prevalence is higher in developing than in developed countries (Celermajer et al., 2012).

Several epidemiological studies performed during the past years have reported an association between *H. pylori* infection and non-gastric systemic diseases, including cardiovascular disease and its associated risk factors (Haider et al., 2002; Gunji et al., 2008; Ohnishi et al., 2008; Satoh et al., 2010; Chen et al., 2015). However, some other reports have not determined such an association (Rothenbacher et al, 2001; Gillum, 2004; Sotiropoulos et al, 2006).

The *H. pylori* infection rate is high in adult patients in Afghanistan (Hamrah et al., 2017). Therefore, an investigation of the association between *H. pylori* and cardiovascular risk factors may have a practical use in Afghanistan. The objective of the present study was to examine the association between *H. pylori* infection and

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cardiovascular risk factors among adult patients visiting an outpatient clinic in Andkhoy, Afghanistan.

Materials and Methods

This cross-sectional study was conducted in an outpatient clinic in Andkhoy, Afghanistan. Two hundred seventy-one consecutive patients were recruited in the study from April 2017 to July 2017. Patients were aged 18 years and older, physically able and willing to participate in the survey. The exclusion criteria were very sick and very old patients.

Measurements

Data were collected by using the World Health Association (WHO) STEPwise approach to surveillance, which includes three sections: demographic, physical, and biochemical measurements (WHO, 2011).

The questionnaire was modified, and was adapted to local needs.

1.3. For each patient, the following socio-demographic information was collected:

Age, sex, educational level (illiterate, primary or private education, secondary, high school or higher education) marital status (single, married, or other), and occupation (employed, unemployed, housewife, or farmer). Face-to-face interviews were conducted by trained doctors.

2.3. Physical examination

Body mass index (BMI): Body weight was measured using a digital scale accurate to the nearest 0.1 kg. BMI was calculated as weight (kg) divided by the square of the overweight or obese were defined as a BMI to height (in meters), squared. Being overweight or obese were defined as a BMI. Overweight and obesity were defined as BMI of 25 to < 30 kg/m^2 and BMI ≥ 30 kg/m^2 , respectively (Musaiger, 2011).

Hypertension: Hypertension was defined as systolic blood pressure systolic blood pressure (SBP) of of ≥140 mm Hg or diastolic blood pressure (DBP) of ≥90 mm Hg (hereafter referred to as ≥140/90 mm Hg), at separate occasions, andand those already on antihypertensive medications at the time of admission (James et al, 2014).

Diabetes mellitus (DM): A fasting blood glucose (FBS) level of ≥126 mg/dL, or a random blood glucose level of ≥200 mg/dL, or self-reported use of anti-diabetic medications (American Diabetes Association, 2014).

Laboratory tests

FBS, total cholesterol, and triglycerides (TG) were measured, by using an HP-CHEM250Y auto analyzer (Zhengzhou Hepo International Trading Co.Ltd, Zhengzhou, China). The cut-offs for abnormal levels were: TG ≥150 mg/dL, total cholesterol ≥200 mg/dL. Individuals with a random blood glucose of ≥200 mg/dL were later confirmed by FBS (National Cholesterol Education Program Expert Panel and National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III), 2002).

Smoking: (i) Current smokers were defined as patients who have smoked at least 100 cigarettes in their lifetime, and currently smoke cigarettes every day; (ii) Past smokers were defined as patients who had smoked at least 100 cigarettes in their lifetime, but they currently do not smoke; (iii) Non-smokers were defined as patients who have never smoked a cigarette or who smoked fewer than 100 cigarettes in their lifetime (but had stopped smoking at the time of the interview (past smokers); (iii) patients who have never smoked, or who had smoked < 100 cigarettes in his or her lifetime (non-smoker) (Hodge and Nandy, 2011).

Physical inactivity was defined not performing physical activity of moderate intensity for more than 30 minutes, at least 4 days per week (Haskell et al,, 2007).

Detection of *H. pylori* infection: A diagnosis of *H. pylori* infection was confirmed by serological detection of anti-H. pylori IgG antibodies Serum samples were also collected from the patients and tested for *H. pylori* using ELISA (Leal et al, 2008).

The study was approved by the scientific review committee of Balkh Regional Hospital.

Statistical analysis

Categorical variables were compared by Chi-square tests, while the T test was used to compare continuous variables. The odds ratios and its 95% confidence intervals (CIs) were calculated to in the logistic regression analysis. P value less than 0.05 were considered significant. Data were presented as mean ± standard deviation (SD). All analyses were performed with the SPSS 24.0 software package (SPSS, Armonk, NY: IBM Corp).

Results

In total, 271 patents participated in this study. Of these, 102 (37.6%) were male and 169 (62.4%) female. The mean age of the patients who were *H. pylori*-positive and *H. pylori*-negative was 51.0 ± 17.6 years and 51.6 ± 17.6 years, respectively. Patients with hypertension had significantly higher prevalence of *H. pylori* infection compared with to than among those without hypertension (P < 0.001). Patients with a BMI ≥25 were associated with *H. pylori* infection ((p = 0.03). Smokers had higher rates of *H. pylori* than nonsmokers (P = 0.04). Patients with *H. pylori* had substantially increased levels of both systolic blood pressure (SBP) and diastolic blood pressure (DBP) (144.1 ± 26.3 vs.121.3 ± 16.3 mm Hg, and 92.8 ± 15.8 vs. 80.5 ± 9.8 mm Hg; P < 0.001, respectively; Table 1).

The *H. pylori* infection rate among patients with DM was significantly higher than in those without DM (42.8% vs. 11.0%; P < 0.001). Illiteracy was more common among patients without hypertension than patients with hypertension (30.7% vs. 17.5%, P = 0.03). There was a statistically significant difference in total levels between the *H. pylori-positive* and *H. pylori*-negative patients (174.8±32.7 vs.171.2±26.7 mg/dL; P = 0.016). Patients with *H. pylori* had substantially increased levels of fasting blood glucose (124.2 ± 36.6 vs.115.3 ± 32.2 mg/dL; P < 0.001). However, there was no association between *H. pylori* infection and other factors, including age, sex,

Table 1. Baseline characteristics of participants with or without *H. pylori* infection

Characteristics	H. pylori-negative (n-82)	H. pylori-positive (n-189)	*p value*
Age, mean, years	51.0±17.6	51.6±17.6	0.874
Male, no. (%)	34 (41.5%)	68 (36.0%)	0.392
Level of education, no. (%)			0.548
Illiterate	63 (76.8)	138 (73.0)	
Primary/private education	3 (3.6)	5 (2.6)	
Secondary	4 (4.9)	19 (10.0)	
High school or more	12 (14.6)	27 (14.3)	
Marital status, no. (%)			0.284
Single	14 (17.1)	20 (10.6)	
Married	64 (78.0)	162 (85.7)	
Others	4 (4.9)	7 (3.7)	
Hypertension, no. (%)			<0.001
Yes	22 (26.8)	109 (57.8)	
No	60 (73.2)	80 (42.3)	
Occupation, no. (%)			0.951
Employed	10 (12.2)	21 (11.1)	
Unemployed	33 (40.2)	86 (45.5)	
House wife	14 (17.1)	30 (15.9)	
Others	2 (2.4)	5 (2.6)	
Body mass index (BMI), kg/m^2, no. (%)			0.03
<25	60 (73.2)	96 (50.8)	
≥25	22 (26.8)	92 (48.7)	
Smoking cigarettes, no. (%)			0.047
Current smokers	11 (13.4)	49 (25.9)	
Past smokers	9 (11.0)	12 (6.3)	
Non-smokers	62 (75.6)	128 (67.7)	
Systolic blood pressure, mean (SD) mm Hg	121.3±16.3	144.1±26.3	<0.001
Diastolic blood pressure, mean (SD) mm Hg	80.5±9.8	92.8±15.8	<0.001
Fasting blood glucose, mean (SD), mg/dL	115.30±32.8	124.2±36.6	0.01
Diabetes mellitus (DM)	9 (11.0%)	81 (42.8%)	<0.001
Total cholesterol, mean (SD), mg/dL	171.2±26.7	174.8±32.7	0.016
Triglyceride, mean (SD), mg/dL	159.0±40.4	159.7±35.2	0.867
Proton-pump inhibitors, no. (%)	26 (31.7)	44 (23.3)	0.174
Histamine 2 receptor antagonist, no. (%)	4 (4.9)	1 4 (7.4)	0.442
Statins, no. (%)	22 (26.8)	52 (27.5)	0.908
Lack of regular physical exercise, no. (%)	54 (65.8%)	117 (61.9%)	0.173

HDL-c, high density lipoprotein cholesterol; LDL-c, low density lipoprotein cholesterol

level of education, marital status, occupation, triglyceride level, lack of physical activity, proton-pump inhibitors, statins, and histamine 2 receptor antagonist uses.

Table 2 presents the summary of statistics from the multivariate logistic regression analysis the association between *H. pylori* infection with SBP, DBP, total cholesterol levels, BMI, diabetes mellitus and smoking.

Table 2. Odds Ratio of *H. pylori* Infection for Cardiovascular Risk Factors

Variables	OR	(95% CI)	P value
Diabetes mellitus	3.16	(1.31-7.62)	0.011
Systolic blood pressure	1.01	(0.97-1.06)	0.576
Diastolic blood pressure	1.07	(0.99-1.15)	0.092
Body mass index, mean	1.67	(1.08-1.26)	<0.001
Smoking	1.38	(0.58-3.31)	0.463

OR, Odds ratio; CI, confidence interval

H. pylori infection was considered a dependent variable and SBP, DBP, total cholesterol levels, BMI, DM and smoking were considered independent variables. DM (95%CI 1.31-7.62, P = 0.011), and BMI (OR 1.17, 95% CI 108-1.26, P < 0.001) were significantly associated with risk of *H. pylori* infection.

Discussion

Our knowledge, this is the first study to investigate the association between *H. pylori* infection with risk factors for cardiovascular disease among the Afghan population. The present study indicated that *H. pylori* seropositivity was significantly associated with DM, and increased BMI.

In our study, we found a significant association between *H. pylori* infection and DM which is comparable with the results of others studies (Bener et al., 2007; Devrajani et al., 2010). The risk of gastric cancer was increased considerably among patients with both DM and *H. pylori* infection. DM increased the risk of gastric cancer synergistically with *H. pylori* infection (Sakitani et al., 2015). Recently, an increase in the prevalence of DM has been reported and some researchers have focused on the relationship between DM and *H. pylori* infection with gastric cancer (Yoon et al., 2013; Tseng and Tseng, 2014).

Ikeda et al., (2009) found that hyperglycemia is one of the possible cofactors increasing the carcinogenic. Effects of *H. pylori* infection. Hyperglycaemia and H pylori infection have a synergic effects on gastric carcinogenesis It has been hypothesized that hyperglycaemia induces gastric carcinogenesis through increasing reactive oxygen -related damage to *H.pylori* infection to DNA, resulting in genetic changes to the *H. pylori*-infected gastric epithelial cells (Tseng and Tseng, 2014). Moreover, a synergistic interaction between hyperglycemia and H. pylori infection have been found to increase the risk of colorectal adenoma, which is a pre-cancer lesion which develops into colorectal carcinoma (Hu et al., 2017).

The present study showed that there is a relationship between *H. pylori* infection and raised BMI. This finding is consistent with that of previous studies (Arslan et al., 2009; Dutta et al., 2009; Dhurandhar et al., 2015). There are a lot of evidence that support the correlation between obesity and the risk of colon cancer, postmenopausal breast cancer, endometrial cancer, renal cell cancer, and adenocarcinoma of the esophagus (Boeing, 2013). A number of potential mechanisms have been proposed to explain the relationship between obesity and cancer development including obesity-related hormones, growth factors, modulation of energy balance and calorie restriction, multiple signaling pathways, and inflammatory processes, leading to cancer cell progression (Ho and Spiegel, 2008).

Limitations

This study has some limitations This study has some limitations that have to be pointed out. First, the study comprised a relatively small sample size. In addition, we relied on only serological tests for detection of *H. pylori* infection in our study. However, our outpatient clinic is a referral center in our province and the patient population could be considered to be reasonably representative, assuming that morbidity patterns patterns do not differ significantly in practice in various parts of Afghanistan.

In conclusion, there was a significant association among *H. pylori* seropositivity, DM and the risk of obesity in an outpatient clinic in northern Afghanistan.

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