Research Article

Is Helicobacter pylori infection more prevalent in diabetics than nondiabetics subjects: comparative study?

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Abstract
Introduction: Helicobacter pylori (HP) infection is considered one of the most prevalent bacterial infections in developing countries. Many studies reported the association between HP infection and diabetes. In this study, we aimed to compare the prevalence of HP infection in diabetic and nondiabetic subjects. **Patients And Methods:** Between July 2016 and August 2017, (53 males and 26 females) diabetic patients compared to 80 nondiabetics as a control group. The exclusion criteria included, patients treated with insulin, proton pump inhibitors, H2 blockers, and bismuth, smokers, pregnancy and those with a known history of HP, gastric cancer, upper gastrointestinal surgery and inflammatory bowel disease. **Results:** The prevalence of HP infection was 65.8% among diabetics while it was 41.7% among nondiabetic subjects. Hence, HP infection is markedly more prevalent among individuals with diabetes (P = 0.02). No significant difference observed in comparison between seropositive and seronegative HP infection regarding laboratory parameters included in the study. **Conclusion:** The results of the present study showed that the prevalence of HP infection is higher in diabetic patients and significantly increased with diabetic risk factors.
Keywords: Helicobacter pylori, prevalence, diabetes, infection

Introduction
Helicobacter pylori (HP) infection is considered one of the most prevalent bacterial infections in developing countries[1]. It was supposed that it causes local inflammation in gastric epithelium, gastritis, gastric ulcer, adenocarcinoma and lymphoma but now, it is known that there is association with many extra gastrointestinal manifestations[2]. This organism causes polymorph nuclear infiltration in gastric mucosa, which gradually replaced by mononuclear cellular infiltration[3]. The mononuclear cells in the gastric mucosa lead to local production of inflammatory cytokines, like interleukin-6 (IL-6), C-reactive protein and tumor necrosis factor alpha (TNF-α), leading to systemic inflammation[4]. Elevated levels of these cytokines may lead to phosphorylation of serine residues on the insulin receptor substrate, which prevents its interaction with insulin receptors, inhibiting insulin action[5]. Mammalian stomach produces leptin and ghrelin, two hormones involved in energy homeostasis, whose interactions affect obesity, insulin sensitivity, and glucose homeostasis. Increasing evidence indicates that HP is involved in the regulation of these hormones[6]. Also, it has been proposed that HP infection may have more occurrence among people with diabetes[3]. Above that, it is shown that diabetic patients are at high risk for coronary artery disease and the point that HP infection predisposes people to vascular affection, which make the relationship between diabetes and HP infection important because the proof of this association may be a reason to discuss about the treatment of infection in diabetic patients to minimize the risk of cardiovascular events[1]. So, our aim in this study to compare the predominance of HP infection in diabetic and nondiabetic individuals.

Patients and methods
Patient and control cell lines:
Between July 2016 and August 2017, (53 males and 26 females) diabetic patients referred to out clinic in this study. We compared those patients with 80 nondiabetics referred to the hospital as a control group. Informed consent from all participants was written. Approval for this study was obtained from the ethics committee for all participants.

The exclusion criteria included, patients treated with insulin, proton pump inhibitors, H2

blockers, and bismuth, smokers, pregnancy and those with a known history of HP, gastric cancer, upper gastrointestinal surgery and inflammatory bowel disease.
All patients were subjected to full history taking and complete clinical assessment.

Clinical and Laboratory methods:
Demographic characteristics such as age, gender, body mass index (BMI),calculated by dividing bodyweight (kg) by squared height (m), abdominal circumference, exercise, symptoms of dyspepsia, nausea, vomiting, and history of gastrointestinal bleeding were recorded. For every subject twelve hours fasting venous blood samples (10 ml) as total then 8 ml were collected in plain tubes, and centrifuged at2000 rpm for 15min immediately after sampling for assessment of biochemical markers including low-density lipoprotein (LDL), high density lipoprotein (HDL), triglycerides (TG), fasting blood sugar (FBS), then remainning 2 ml blood which was collected on EDTA (anticoagulant) used for HbA1cassay. All assessment of biochemical markers done by Beckman CX4 chemistry analyzer (NY, USA) supplied by (Eastern Co. for Eng.& Trade-Giza, Egypt). Also, fasting insulin levels were checked, serum insulin was measured using ELISA kit, DRG International, Inc. USA .The subjects were tested for the presence of HP infection using a sandwich enzyme-linked immunesorbent assay ELISA kit Immundiagnostic AG company, Bensheim, for determination of HP in stool sample the specimen was stored at –20°C and then prepared by adding a stool sample of 100 mg to 1 ml of the sample dilution buffer (SAMPLEBUF) and homogenize thoroughly on a Vortex-mixer. Centrifuge the suspension for 15 min at 3000 rpm.

Based on the cutoff value which was (0.150), samples with absorbance more than 0.020 were considered positive.

Statistical analysis methods:
The collected data were tabulated and statistically analyzed using SPSS program (Statistical Package for Social Sciences) software version 24. Descriptive statistics for parametric quantitative data are presented by mean ± standard deviation (SD) and range, while for categorical data by number and percentage. Independent sample t test and Mann Whitney test were used for analyses of parametric and non-parametric quantitative data between two groups. Correlation between two quantitative variables was done by Pearson's correlation coefficient. Correlation coefficient ranges from (0-1):- weak (r=0-0.24), fair (r=0.25-0.49), moderate (r=0.5-0.74), strong (r=0.75-1). A value of P <0.05 was considered as statistically significant. Figures were done using Excel office 10.

Results

In this study,159 cases (80 nondiabetic and 79 diabetic patients) were recruited . Initially, the two groups were compared for age, gender and body mass index and HP seropositivity. There is significant difference between the two groups regarding body mass index P <0.001. The prevalence of HP infection was 65.8% among diabetics while it was 41.7% among nondiabetic subjects [Table 1]. Hence, HP infection was markedly more prevalent among individuals with diabetes (P = 0.02). No significant difference observed in comparison between seropositive and seronegative HP infection regarding laboratory parameters included in the study [Table 2 & 3]

While, in comparison between diabetic and nondiabetic subjects, among the variables affecting the HP infection, the LDL, cholesterol, fasting insulin and BMI were the only parameters show significant difference with P value (<0.001) [Table 4].

Table (1): Some characteristics of the patients in diabetic and nondiabetic group

Parameter	Diabetics (n=79) (%)	Non diabetic (n=80)(%)	P(value)
Age	40.2±7.9	39.4±8.2	0.9
Gender female/male	53(46.9)/26(56.5%)	60(53.1%)/20(43.5%)	0.3
BMI	32.5±7.3	25.9±8.8	<0.001
HP seropositivity	52 (65.8)	38(41.7%)	0.02

Table (2): Comparison of laboratory parameters in HP+ and HP− groups among diabetic patients

Parameter	Diabetic		P	95% CI
	HP^+ (n=52)	HP^-(n=27)		
HDL	33.3±5.5	32.4±5.7	0.5	-1.78-3.47
LDL	117±31.4	124.1±28.8	0.3	-21.49-7.38
TG	190.5±34.6	198.7±29.2	0.3	-23.7-7.36
Cholesterol	188.4±30.5	196.3±27.2	0.3	-21.7-6.06
Fasting insulin	11.5±5.7	10.6±5.6	0.5	-1.78-3.58

Table (3): Comparison of laboratory parameters in HP+ and HP− groups among nondiabetics

Parameter	Non diabetic			
	HP^+(n=38)	HP^- (n=42)		
HDL	40.4±7.2	41.9±6.4	0.4	-4.44-1.62
LDL	118.5±41.2	117.5±52.7	0.9	-20.1-22.2
TG	150.8±44.5	150±38.7	0.9	-17.7-19.4
Cholesterol	189.2±41.9	189.4±51.7	0.9	-21.2-20.9
Fasting insulin	3.9±0.6	3.7±0.9	0.2	-0.13-0.6

Table (4): Comparison of laboratory parameters in diabetics and nondiabetics

		Diabetic n=79	Non-diabetic n=80	T p vlaue
BMI	**Range**	15-42	18-45	5.1
	Mean±SD	32.5±7.3	25.9±8.8	<0.001
F insulin	**Range**	2.1-25	0-6	11.6
	Mean±SD	11.2±5.6	3.8±0.8	<0.001
Chol	**Range**	123-270	123-330	0.3
	Mean±SD	191.1±29.5	189.3±46.9	<0.001
Tri	**Range**	87-300	85-300	7.2
	Mean±SD	193.3±32.9	150.4±41.3	0.05
Hba1c	**Range**	4.6-10.9	1.7-6.5	15.2
	Mean±SD	7.9±1.5	4.2±1.6	0.4
HDL	**Range**	20-45	29-58	8.3
	Mean±SD	33±5.5	41.2±6.8	0.3
LDL	**Range**	57-197	39.4-255.8	0.2
	Mean±SD	119.4±30.6	117.9±47.3	0.001

Discussion

Due to cellular immunity disorders and phagocyte dysfunction caused by hyperglycemia and decreased vascularization in diabetic patients, they are more susceptible to infections and severe diseases. Although the relationship between DM and HP infection is controversial, high prevalence of HP infection has been reported in diabetic patients in previous studies[7–9].

In our study, the prevalence of HP infection was 65.8% among diabetics while it was 41.7% among nondiabetic subjects (P=0.02), and this is comparable to the findings of Jamshid et al., who found that HP infection is more prevalent in diabetic patients (65.9%) versus non diabetics (50.5%) [10]. These findings also confirmed in other study by Talebi-Taher et al., who detected significant prevalence among diabetic 60% and nondiabetic patients 26.66%,

respectively (P=0.001)[11]. Candelli et al., also confirmed these results after long period follow up (3 years) with higher rate of reinfection among diabetic patients[12].

Although, some studies have not supported this association. In a study done by Małlecki et al., the prevalence of HP in type 2 diabetes was 50% which was comparable to control group. Also, no association was found between HP infection, glycemic status, and diabetes duration with upper gastrointestinal symptoms in these diabetic subjects [13].
Another study revealed no significant difference of HP prevalence between diabetics ((37.3%) and nondiabetics (35.2%) [14].

Explanation of these findings of higher prevalence of HP in diabetic patients was reported in some studies. Gentile et al., reported that the HP infection has a significant association with autonomic neuropathy[15]. It is likely that autonomic neuropathy in diabetic patients will delay gastric emptying, which causes an imbalance between the absorption of carbohydrates and insulin secretion that will result in tighter control of blood sugar. On the other side, a decrease in gastric acid secretion in diabetic patients may facilitate bacterial colonization of the gastrointestinal tract. Theoretically, it is believed that diabetics are more susceptible to colonize HP due to elevated blood glucose level and subsequently, gastric mucosal change and increased glucose concentration in it. Another reason for the higher prevalence of HP infection in diabetics is the higher rate of hospital admission in these patients[16]. On the other hand, the increased risk of coronary artery disease in diabetic patients makes the HP infection in diabetics important[1] As it is reported that HP infection is significantly associated with coronary artery disease[14]. These reasons raise the hypothesize that people with diabetes are more prone to HP infection.

In our study we didn't find significant difference in insulin level between seropositive and seronegative HP infection in diabetic patients while, the higher prevalence of HP infection in these patients can be explained by the chronic inflammation caused by HP infection, which increases insulin resistance as a major cause of diabetes[17].

In agreement with our study, some studies showed that HP infection increases the risk factors of type 2 diabetes. For example, Cohen et al., demonstrated a higher BMI in patients with HP infection[18]. In addition, HP infection has been shown to interfere with the serum lipid profile and it can be a risk factor for diabetes by this way[19].

Conclusion

The results of the present study showed that the prevalence of HP infection was higher in diabetic patients and significantly increased with diabetic risk factors however,

Recommendation

Further studies will be done in the near future on large scale of sample size to detect H. pylori in diabetics patients to get more valuable and precious results.

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