

Helicobacter pylori IgG antibodies in association with secondary hyperparathyroidism in end-stage renal failure patients undergoing regular hemodialysis

Azar Baradaran¹, Hamid Nasri²

¹Department of Biochemistry, Center of Research and Reference Laboratory of Iran, Hospital Bu Ali, Tehran, Iran

²Shahrekord University of Medical Sciences, Hajar Medical, Educational and Therapeutic Center, Department of Internal Medicine, Shahrekord, Iran

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Corresponding author:

Hamid Nasri, MD
Shahrekord University of Medical Sciences
Hajar Medical, Educational and Therapeutic Center
Department of Internal Medicine
Shahrekord, Iran
Phone: (00) 98 381 222 00 16
Fax: (00) 98 381 224 37 15
E-mail: hamidnasri@yahoo.com, hamidnasri@skums.ac.ir

Abstract

Helicobacter pylori (*H. pylori*) has been shown to play an important role in the development of gastritis and gastric ulcer. Excess parathyroid hormone (PTH) has long been considered detrimental to the health of patients with end-stage renal disease. PTH has been implicated as a multisystem uremic toxin, and hyperparathyroidism can be a debilitating complication in dialyzed patients. The aim of our study was the assessment of relationships between PTH abnormalities and concentration of IgG antibodies against *H. pylori*. The study included 44 (F=17, M=27) stable hemodialysis (HD) patients with upper gastrointestinal symptoms. Significant positive correlations between *H. pylori* IgG antibody titers with serum iPTH and phosphorus and significant inverse correlation of *H. pylori* IgG antibody titers with serum alkaline phosphatase were found. Hyperparathyroidism is related with stimulation of gastrin synthesis as well with increased acidity of gastric juice. Hypergastrinaemia induced stimulation of gastrin synthesis and resultant increased acidity of gastric juice could intensify the *H. pylori* infection in HD patients. Further studies on the association of secondary hyperparathyroidism with helicobacter pylori infection are necessary, because both dyspeptic symptoms and secondary hyperparathyroidism are quite common in HD patients and in the meantime, more attention toward control of high levels of parathormone in HD patients is needed.

Key words: secondary hyperparathyroidism, hemodialysis, parathormone, end-stage renal failure, Helicobacter pylori IgG specific antibodies.

Introduction

Helicobacter pylori (*H. pylori*) has been shown to play an important role in the development of gastritis and gastric ulcer [1]. End-stage renal failure patients often have dyspeptic symptoms and may develop peptic disease or digestive disorders leading to severe gastrointestinal complications [2]. Studies on the relationship between high serum urea nitrogen, creatinine and *H. pylori* infection in hemodialysis (HD) patients still give conflicting results [3]. While the precise nature of the gastroduodenal involvement in these patients remains unclear, the link between *H. pylori*, chronic gastritis and peptic ulcer disease has grown stronger [4-6]. It has been reported that patients with chronic renal failure have a tendency to increased incidence of peptic ulcer diseases. However, it is yet unclear whether the increased

incidence is due to altered gastric acidity, hypersecretion of gastrin, or increased colonization of *Helicobacter pylori* [7-8], and quite few reports are available regarding the promoting factors affects *H. pylori* infection in HD patients. Excess parathyroid hormone (PTH) has long been considered detrimental to the health of patients with end-stage renal disease. PTH has been implicated as a multisystem uremic toxin, and hyperparathyroidism can be a debilitating complication in dialyzed patients [9]. It is known that hyperparathyroidism is connected with stimulation of gastrin synthesis as well with increased acidity of gastric juice [10] and it is possible that a connection between susceptibility to *H. pylori* infection and secondary hyperparathyroidism might exist. The aim of our study was the assessment of relationships between PTH abnormalities and the parameter of *H. pylori* infection as expressed by concentration of IgG antibodies against *H. pylori*.

Material and methods

This is a cross-sectional study that was conducted on patients with end-stage renal disease undergoing maintenance hemodialysis treatment with acetate basis dialysate and polysulfone membranes. All patients had various upper gastrointestinal complaints consisting of epigastric pain, epigastric burning, postprandial fullness, early satiety, bloating and belching. Exclusion criteria for patients were using of H2 proton pump inhibitors, antibiotics and aluminum hydroxide gels as well as active or chronic infection before the study. According to the severity of the secondary hyperparathyroidism, each patient was under treatment for SHPTH with oral active vitaminD3 (Rocaltrol), calcium carbonate and Rena-Gel capsules at various dosages. After an overnight fast, blood samples were obtained. Intact serum PTH (iPTH) was measured by the radioimmunoassay (RIA) method using DSL-8000 of USA (normal range of values is 10-65 pg/ml). Serum *Helicobacter pylori* specific IgG antibody titers (titer >10 U/ml was interpreted as positive according to the manufacturer's instructions) was measured by enzyme-linked immunosorbent assay (ELISA) method using Trinity Biotech Kits (USA). Also peripheral venous blood samples were collected for biochemical analysis including serum post and predialysis blood urea nitrogen (BUN), serum calcium (Ca), phosphorus (P), alkaline phosphatase (ALP), serum and magnesium (Mg), albumin (Alb), C-reactive protein (CRP) were measured using standard kits. For the efficacy of hemodialysis the urea reduction rate (URR) was calculated from pre- and post-blood urea nitrogen (BUN) data [11]. Body mass index (BMI) calculated using the standard formula (postdialysed weight in kilograms/height in square meters; kg/m²) [12]. Duration and doses of hemodialysis treatment were calculated from patients' records. The duration of each hemodialysis session was four hours.

Table I. Patients' data

N=44	Mean ±SD	Median
Age [years]	43±17	40
DH* [months]	29±34	17.5
Dialysis dose	259±366	121.5
Sessions URR [%]	59±9	57.5
BMI [kg/m ²]	21±3.7	20.5
iPTH [Pg/ml]	390±422	244
Ca [mg/dl]	7.7±0.9	7.9
P [mg/dl]	6.5±2	6.4
ALP [IU/L]	595±817	414
CRP [mg/l]	9.5±8	8
Mg [mg/dl]	2.45±0.4	2.4
Alb [g/dl]	3.7±0.5	3.8
H. pylori-IgG [U/ml]	7.7±10	2

*Duration of hemodialysis

For statistical analysis, the data are expressed as the mean ±SD or median values. Statistical correlations were assessed using partial correlation test. All statistical analyses were performed using SPSS (version 11.5.00). Statistical significance was determined at a p-value <0.05.

Results

The study included 44 (F=17, M=27) stable hemodialysis (HD) patients with upper gastrointestinal symptoms as mentioned. Table I shows the patients data. Mean ages of patients were 43±17 years. The length of the time patients had been on hemodialysis was 29±34 months (median: 17.5 months).

The value of serum *H. pylori* specific IgG antibody titers of was 7.7 (±10) U/ml (median: 2 U/ml). The value of serum iPTH was 390±422 Pg/ml (median: 244

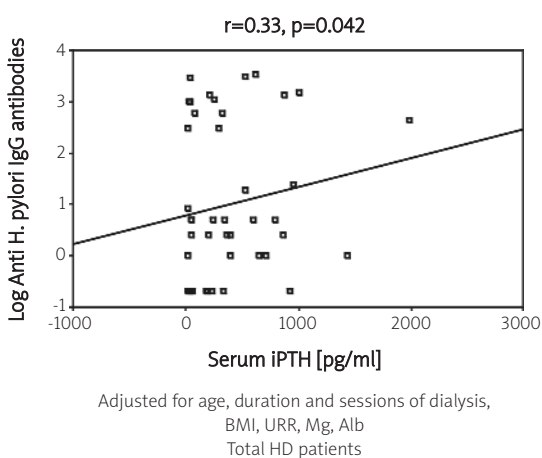
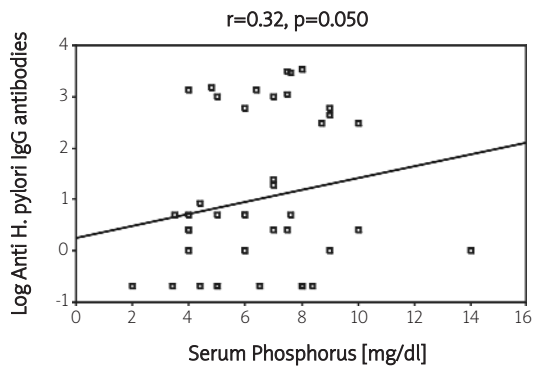
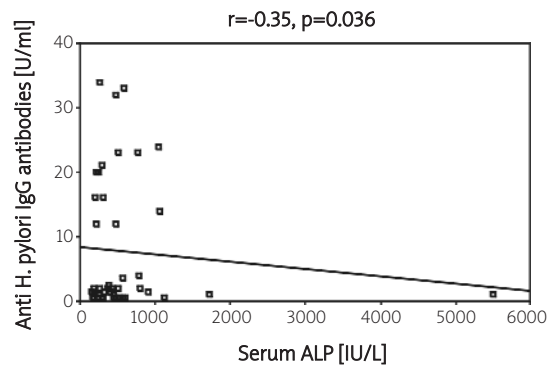


Figure 1. Significant positive correlation of logarithm of *Helicobacter* IgG antibody titers with serum iPTH



Adjusted for age, duration and doses of dialysis,
DM, Alb, Mg, CRP
Total HD patients

Figure 2. Significant positive correlation of logarithm of helicobacter IgG antibody titers with serum Phosphorus



Adjusted for age, duration and doses of dialysis,
gender, BMI, DM, iPTH, Alb, Mg
Total HD patients

Figure 3. Significant inverse correlation of helicobacter IgG antibody titers with serum ALP

Pg/ml). In this study a significant positive correlation of logarithm of H. pylori IgG antibody titers with serum iPTH was seen ($r=0.33$, $p=0.042$; Figure 1) (adjusted for age dialysis duration and sessions, BMI, URR, Mg and Alb). A significant positive correlation of logarithm of H. pylori IgG antibody titers with serum phosphorus ($r=0.32$, $p=0.050$; Figure 2) (adjusted for age dialysis duration and sessions, DM, BMI, URR, Mg and Alb) was also found. Moreover, a significant inverse correlation of H. pylori IgG antibody titers with serum ALP ($r=-0.35$, $p=0.036$; Figure 3) (adjusted for age, dialysis duration and sessions, DM, BMI, gender, iPTH, Mg and Alb) was found.

Discussion

In this study we found significant positive correlations of H. pylori IgG antibody titers with serum iPTH and Phosphorus and a significant inverse correlation of H. pylori IgG antibody titers with serum ALP. Secondary hyperparathyroidism (SHPT) is common in patients with chronic renal failure. It is characterized by excessive serum parathyroid hormone (PTH) levels, and an imbalance in calcium and phosphorus metabolism [13]. PTH acts as a uremic toxin and may be responsible for many common complications in HD patients [14-15]. Hyperparathyroidism is connected with stimulation of gastrin synthesis as well as with the increased acidity of gastric juice [10]. We speculate that it should be connected with susceptibility to H. pylori infection in HD patients. In the accessible literature quite few data about the connection between Helicobacter pylori (H. pylori) infection and parathyroid hormone (PTH) abnormalities in patients on hemodialysis existed. In contrast to our findings, a study conducted by Bednarek-Skublewska et al. on 65 (37 M, 28 F) stable HD patients could not show any significant relationship between PTH

abnormalities and H. pylori infection in HD patients [10]. Hypergastrinaemia is a common finding in haemodialysis patients [16]. Hypergastrinaemia induced stimulation of gastrin synthesis and resultant increased acidity of gastric juice could intensify the H. pylori infection in hemodialysis patients. We strongly propose to carry out further studies on the association of secondary hyperparathyroidism with H. pylori infection, because both dyspeptic symptoms and secondary hyperparathyroidism are quite common in chronic hemodialysis patients and in the meantime, more attention toward control of high levels of parathormone in HD patients is needed.

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