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Original Article

Effect of Duration on Hemodialysis on Prevalence of *Helicobacter pylori* Infection

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ABSTRACT. Digestive tract complications are common in hemodialysis (HD) patients, and *Helicobacter pylori* (*H. pylori*) is thought to play an important role in the pathogenesis of gastrointestinal mucosal lesions in these patients. Also, reports indicate that cytotoxin-associated gene A (CagA) is the major factor involved in the pathogenesis of *H. pylori* disease. However, many issues regarding *H. pylori* infection in HD patients are still unclear. In this cross-sectional study, we investigated the effect of duration on HD on the prevalence of *H. pylori* infection and its virulent CagA(+) strain. One-hundred and fifty-one HD patients who were referred to our university HD center were included in the study. There were 78 males and 73 females, with a mean age of 54.2 ± 14.6 years (range: 19–87 years). They were tested for serum anti-*H. pylori* IgG antibody by the enzyme-linked immunosorbent assay method. Also, anti-CagA IgG antibody was tested in *H. pylori*-infected patients. The study patients were categorized into two groups: short-term HD duration (STHD: ≤3 years) and long-term HD duration (LTHD: >3 years). The overall prevalence of antibodies to *H. pylori* and CagA were 65.6% (99/151) and 25.3% (25/99), respectively. The prevalence of *H. pylori* infection among the STHD and LTHD patients were 49/89 (55.10%) and 49/62 (79.0%), respectively; P <0.05. The prevalence of anti-CagA antibody in infected STHD and LTHD patients was 24.5% (12/49) and 26.5% (13/49), respectively; P >0.05. Our study suggests that the prevalence of *H. pylori* infection is higher in patients on LTHD. More investigations are needed regarding the clinical consequences of *H. pylori* infection in HD patients.

Introduction

Patients on hemodialysis (HD) often have gastrointestinal complications.[1] *Helicobacter pylori* (*H. pylori*) is known to be a causative agent of digestive disease. [2] However, it is not completely clear if *H. pylori* infection is more prevalent in HD patients. Numerous studies have been performed to investigate whether uremia or urea concentration in gastric secretion creates a favorable milieu for *H. pylori* infection.[3] However, there is scant data concerning the prevalence of *H. pylori* in patients on maintenance HD in developing countries.[1,4] On the other hand, reports exist that formation

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Table 1. Demographic and clinical characteristics of patients based on duration on hemodialysis.

	Short-term hemodialysis	Long-term hemodialysis	*P*
Female/male	43/46	30/32	0.993
Age (years)	54.4 ± 15.3	53.9 ± 13.7	0.825
Hemodialysis duration (months)	20.6 ± 11.3	83.6 ± 44.4	0.00
Dyspepsia (yes/no)	32/57	29/33	0.183
Gastrointestinal bleeding (yes/no)	3/86	6/56	0.107
Diabetes mellitus (yes/no)	24/65	16/46	0.874
Smoking (yes/no)	14/75	7/54	0.461

of ulcers correlates strongly with the expression of cytotoxin-associated gene A (CagA) protein of *H. pylori*. Patients colonized by strains containing the CagA present with more severe gastric inflammation.[5,6] There remains a high genetic and geographic variability that characterizes *H. pylori* [7] and its virulence markers in patients on HD. In this study, we aimed to evaluate the effect of duration on HD on the prevalence of antibodies toward *H. pylori* and CagA in HD patients in Iran.

Materials and Methods

One-hundred and fifty-one patients who were on maintenance HD at the HD Center at the Urmia University of Medical Sciences, Urmia, Iran, were enrolled in the present study. Patients were divided into two groups based on their duration on HD treatment: duration ≤3 years; short-term HD (STHD) and >3 years; long-term HD (LTHD). Demographic data and informed consent, medication history, smoking habit and other relevant clinical data including dyspepsia, diabetic mellitus and gastrointestinal bleeding were obtained from related questionnaires. Peripheral blood samples were collected from each patient after HD. The blood samples were centrifuged and the serum were separated and frozen at -80°C until analysis. The presence of serum IgG antibody against *H. pylori* was determined by an enzyme-linked immunosorbent assay (ELISA) kit (Globe Co., Milan, Italy). Serum anti-CagA IgG antibody was determined in *H. pylori*-infected patients by ELISA kit (DiaPro Co.). Statistical analysis was performed using SPSS Version 16. Chi-square test and "*t*" test for distribution and trends were used at a 0.05 level of statistical significance.

Results

Overall, 151 patients (78 male and 73 females) were eligible for the study. The age of the participants ranged between 19 and 87 years (mean: 54.2 ± 14.6 years). Eighty-nine patients (46 male and 43 female) on STHD were available for analysis (mean age: 54.4 ± 15.3 years). Also, 62 patients (32 male and 30 female) on LTHD were included in the study (mean age: 53.9 ± 13.7 years). The mean duration on HD in STHD and LTHD patients was 20.6 ± 11.3 and 83.6 ± 44.4 months, respectively; $P < 0.05$. The prevalence of *H. pylori* in the STHD patients had similar demographic and clinical characteristics including age, sex, dyspepsia, gastrointestinal bleeding, diabetic mellitus and smoking habits in comparison with the LTHD patients; $P > 0.05$ (Table 1). From analysis, the overall prevalence rates of *H. pylori* in STHD and LDHD patients were 55.1% (49/89) and 79.0% (49/62), respectively; $P < 0.05$. In infected patients, serum anti-CagA antibody was present in 24.5% of STHD patients (12/49) and 26.5% of LTHD patients (13/49); $P < 0.05$ (Table 2). Infected patients in the STHD group had similar demographics to the LTHD group.

Discussion

In most studies, patients receiving HD had a significantly lower prevalence of *H. pylori* infection.[8-10] On the other hand, a few studies have found no difference in the rate of *H. pylori* infection between HD patients and healthy

Table 2. Prevalence of anti-*H. pylori* and anti-CagA antibodies based on duration on hemodialysis.

	Short-term hemodialysis	**Long-term hemodialysis**	**ORs**	**CI (95%)**	***P***
H. pylori(+)	49/89 (55.1%)	49/62 (79.0%)	0.003	0.155-0.682	0.002
H. pylori(-)	40/89 (44.9%)	13/62 (21%)			
H. pylori(+)-CagA(+)	12/49 (24.5%)	13/49 (26.5%)	0.817	0.362-1.229	0.817
H. pylori(+)-CagA(-)	37/49 (75.5%)	36/49 (73.5%)			

controls. Fabrizi et al[11] showed similar *H. pylori* sero-positivity in HD and non-HD patients. Furthermore, Luzza et al reported that there was no significant difference in the prevalence of *H. pylori* infection between controls and patients with end-stage renal disease.[12] Also, some investigators have found a higher prevalence of *H. pylori* among HD patients and renal transplant recipients than in patients with normal renal function.[13]

Many studies have evaluated the relationship between *H. pylori* and duration on HD treatment. Nakajima et al[10] reported that the prevalence of *H. pylori* infection markedly decreased when the HD duration was two years and more. It has also been reported that there was no relationship between the duration on HD and the proportion of *H. pylori*-positive patients.[14] Furthermore, Huang et al[15] conducted a study with urea breath test and reported that the mean duration on HD was same in *H. pylori*-positive and *H. pylori*-negative patients. Only few studies have indicated that the prevalence of *H. pylori* infection markedly increased with the duration on HD, as seen in our study In the present study, we investigated 151 HD patients with different durations of treatment and found that the prevalence of *H. pylori* infection in LTHD patients was significantly higher than in the STHD patients. These conflicting results may be related, at least in part, to various factors such as the methods used for detecting *H. pylori* infection, the size of the population studied and the local prevalence of *H. pylori* in the health population, the clinical or demographic features of the study group and other unknown factors, as stated by Fabrizi et al.[11] There is also evidence for a role of CagA positivity. Infection with CagA-positive *H. pylori* is related to more severe morbidity, whereas other variants appear less pathogenic. The prevalence of CagA-positivity showed no difference between *H. pylori*-positive HD population and control population.[11] Also, in our study, the prevalence of antibody against the virulent CagA-positive strain of *H. pylori* was not different in LTHD and STHD patients. It is possible that the relatively small groups of STHD and LTHD patients prevented the finding of a significant difference between the two groups.

In conclusion, the prevalence of antibody toward *H. pylori* significantly increased as the duration on HD increased. Further studies on larger HD patients with documented gastrointestinal diseases and other clinical complications are warranted to clarify this issue.

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