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Helicobacter Pylori IgG Specific Antibodies in Association with Serum Albumin in Maintenance Hemodialysis Patients

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Abstract: This study was conducted to determine the association of serum albumin of hemodialysis patients with Helicobacter pylori (H. pylori) infection. 124 subjects consisting of 44 (F = 27 M = 17) hemodialysis (HD) patients with 34 (F = 21 M = 13) non diabetic hemodialysis and 10 (F = 4 M = 6) diabetic hemodialysis patients and also 88 patients (F = 50 M = 38) were studied. In this study significant inverse correlations of Helicobacter pylori IgG antibodies with serum albumin and with dialysis adequacy were seen. Also near significant inverse correlations of Helicobacter pylori IgG antibodies with dialysis duration and dosage were seen too. The inverse correlation of H. pylori infection with serum albumin may show its important role in malnutrition of hemodialysis which frequently seen in these patients.

Key words: Hemodialysis, Helicobacter pylori, IgG specific antibodies, albumin, urea reduction rate

Introduction

Helicobacter pylori, a bacteria first described in 1984, since that time is linked with chronic gastritis and duodenitis. Dyspeptic symptoms and chronic gastritis are common in patients with chronic renal failure (Zwolinska *et al*., 2000) and Helicobacter pylori (H. pylori) infection has been found in dialysis patients (Aguilera *et al*., 2001). Malnutrition is a problem in a large proportion of dialysis population and is associated with an increased morbidity and mortality (Shih-Hua Lin *et al*., 2002). It is well known that Helicobacter pylori plays an important role in gastritis and peptic ulcer disease in the general population (Ozgur *et al*., 1997), however it seems that among dialysis patients, the proportion of H. pylori-positive patients was low (Nakajima *et al*., 2004) or as high as that for the non-renal disease group (Ozgur *et al*., 1997). Studies on the relationship between high serum urea nitrogen, creatinine and Helicobacter pylori infection in hemodialysis patients still give conflicting results (Tsukada *et al*., 2003). Results of studies indicate that a high blood urea level does not seem to be a risk factor, *per se*, for acquiring H. pylori (Loffeld *et al*., 1991) and even a high serum urea nitrogen may correlate with a low prevalence of Helicobacter pylori infection and the hemodialysis patients with high serum urea nitrogen may be protected against Helicobacter pylori infection (Tsukada *et al*., 2003).In the developing regions a high prevalence of micronutrient malnutrition is frequently seen, some studies have suggested that H. pylori infection may affect the homeostasis of different micronutrients including iron, vitamin B_{12}, folic acid, alpha-tocopherol, vitamin C and beta-carotene (Salgueiro *et al*., 2004), also H. pylori infection may be involved in cases of iron deficiency anemia of unknown origin, and the eradication of the infection may improve blood parameters other than serum ferritin levels (Hacihanefioglu *et al*., 2004). In dialysis patients chronic infections induce overproduction of pro-inflammatory substances, inflammation has been associated with cachexia and anorexia .Infection with H. pylori is also associated with anorexia, inflammation, and malnutrition in dialysis patients (Aguilera *et al*., 2001).Studies concerning the association of H. pylori infection with malnutrition in hemodialysis population are scares . We therefore aimed to conduct a study on the association of serum albumin of hemodialysis patients with heliconbacter pylori IgG antibodies to recognize the effect of H. pylori infection on development of malnutrition, and whether the efficacy of dialysis, duration and dosage have any association with H. pylori infection ?.

Materials 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 (HD group), and a group of patients with normal renal function(control group). All groups 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 H_2 proton pomp inhibitors and antibiotics as well as active or chronic infection before the study. After 12-hour fasting, levels of serum albumin(Alb), predialysis serum

creatinine also pre and post dialysis blood urea nitrogen (BUN) and serum Helicobacter pylori specific IgG antibody titers were measured using standard kits. 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. For the efficacy of hemodialysis the urea reduction rate (URR) was calculated from pre- and post-blood urea nitrogen (BUN) data (Boag, 1994). Body mass index (BMI) calculated using the standard formula (postdialyzed weight in kilograms/height in square meters; kg/m^2) (http://www.halls.md/body-mass-index/av.htm). Duration and doses of hemodialysis treatment were calculated from patients' records. The duration of each hemodialysis session was four hours. For statistical analysis, the data are expressed as the mean ± SD. Comparison between the groups was done using Student's t-test. Statistical correlations were assessed using partial correlation test (for patients) and Pearson test (for control group). All statistical analyses were performed using SPSS (version 11.5.00). Statistical analysis were performed on control group, total HD, females, males, diabetics and non diabetic populations separately. Statistical significance was determined at a p-value <0.05.

Results

The total participants were 124 consisting of 44 (F = 27 M = 17) hemodialysis (HD) patients with 34 (F = 21 M = 13) non diabetic hemodialysis and 10 (F = 4 M = 6) diabetic hemodialysis patients and also 88 patients (f=50 m=38) with upper gastrointestinal symptoms and normal renal function. Table 1 and 2 show the patients and control group data. Mean ages of total HD patients were 43 (±17.6) years. Mean of ages of diabetic and non diabetic dialysis patients were 52 (±16) and 40.6 (±17.3) respectively. Mean±SD of age of control group was 38 (±17.6) years. The length of the time patients had been on hemodialysis was 29 (±34) months (median: 17.5 months). The value of serum Helicobacter pylori (H. Pylori) specific IgG antibody titers of total HD patients was 7.73 (±10.3) u/ml (median:2 u/ml). The value of serum H. Pylori specific IgG antibody titers of control group was 6(± 8) u/ml (median 2.9:u/ml) . In this study no significant difference of age between hemodialysis patients and control group was seen also no significant difference of serum H. Pylori specific IgG antibody titers between hemodialysis patients and control group was seen too(P N.S.). In this study also no significant difference of H. Pylori- IgG antibodies between female and males of control group was found (P N.S.). No significant difference of H. Pylori - IgG antibody titer between diabetic and non diabetic hemodialysis patients was seen also no significant difference of H. Pylori- IgG antibody between female and male dialysis population were found too (P N.S.). No significant correlation between H. Pylori -IgG antibody titers and the age of control group was seen (P N.S.). In total patients, while the association of H. Pylori -IgG antibody with BMI was not significant but evidently was negative. The association of H. Pylori -IgG antibody with age was also non significant too (P.N.S.). In total patients there were significant inverse correlations of H. Pylori-IgG antibody with serum albumin (r = -0.32 P = 0.032; Fig. 1) and with the dialysis efficacy as determined by URR (r = -0.39, P=0.010; Fig. 2) (adjusted for age for above two correlations). In male hemodialysis patients a near significant inverse correlation of H. Pylori-IgG antibody with hemodialysis dosage (adjusted for duration of hemodialysis) (r = -0.38 P = 0.084) and a near significant positive correlation of Helicobacter IgG antibody with duration of hemodialysis treatment (r = 0.37 P = 0.092) were seen too (adjusted for dialysis dosage) .

Discussion

In this study we found no significant difference of serum H. Pylori-IgG antibody titers between hemodialysis patients and control group and no significant correlation between Helicobacter IgG antibody titers and the age of control group. No significant correlations between Helicobacter IgG antibodies and the age of hemodialysis group was seen and also significant inverse correlations of Helicobacter IgG antibodies with serum albumin and also with dialysis adequacy were seen too. In male hemodialysis patients near significant inverse correlations of Helicobacter IgG antibody with dosage and duration of dialysis were seen. In patients under hemodialysis treatment quite few reports are available concerning the prevalence of H. pylori and its influence on nutritional status are available, however some recent reports support the possible association between H. pylori infection and nutritional parameters. To support our finding concerning negative association of H. pylori infection with serum albumin, Sezer *et al.* (2004) in a study to find an association between H. pylori infection and nutritional parameters in HD patients showed that in a group of patients with gastritis associated H. pylori (17 patients) an abnormal values of albumin in contrast to HD patients with normal endoscopy findings (60 patients) or HD patients who had gastritis without H. pylori (86 patients) was existed. Interestingly after eradication of H. pylori by medical treatment which confirmed by repeated endoscopy, the value of serum albumin increased in this group (Sezer *et al.*, 2004). In a study on 168 patients with end-stage renal disease (ESRD; 30 non-dialysis patients, 138 patients receiving dialysis; mean duration of dialysis: 57.3 ± 61.7 months) and 138 control volunteers, Nakajima *et al.* (2004) showed that the percentage of H. pylori infection decreased with a reduction of renal

Table 1: Patients' data

Total patients n=44		Minimum	Maximum	Mean±SD	Median
Age	years	11	80	43±17.6	40.5
DH*	months	2	156	34±29	17.5
Dialysis dose	sessions	18	1584	259±367	121
URR	%	39	76	59.3±8.6	59
BMI	kg/m^2	16	33	21±3.7	20.5
BUN	mg/dl	23	180	81±32	78
Creat	mg/dl	1.5	18	9.5±3.7	9
Alb	g/dl	2.4	5.1	3.8±0.55	3.8
H. Pylri-IgG	u/ml	0.50	34	7.7±10.3	2
Non DM- patients n=34		**Minimum**	**Maximum**	**Mean±SD**	**Median**
Age	years	11	80	40.6±17	40
DH*	months	2	156	33±37	20
Dialysis dose	sessions	18	1584	300±408	135
URR	%	47	76	60.8±7.5	60.5
BMI	kg/m^2	16	33	20.7-4	19.5
BUN	mg/dl	23	108	77±31	74
Creat	mg/dl	1.5	16	9±3.5	9.5
Alb	g/dl	2.4	5	3.8±0.5	3.8
H. Pylri-IgG	u/ml	0.50	34	7.6±10	2
DM- patients n=10		**Minimum**	**Maximum**	**Mean±SD**	**Median**
Age	years	27	79	52±16	55
DH*	months	6	24	14.4±6.7	12
Dialysis dose	sessions	54	216	120±56	99
URR	%	39	76	54±10	55
BMI	kg/m^2	20	25	22.4±1.9	22.5
BUN	mg/dl	30	140	92±34	98
Creat	mg/dl	3	18	9.8±4.4	9
Alb	g/dl	3	4.8	3.7±0.6	3.6
H. Pylri-IgG	u/ml	0.50	33	8±11.7	1.5

*Duration of hemodialysis treatment

Table 2: Data of control group

Control group N=88	Minimum	Maximum	Mean±SD	Median
Age	7	80	38±18	35
H. Pylri-IgG u/ml	0.2	38.5	6±8	2.9

function and the proportion of H. pylori-positive patients decreased with the duration of dialysis, and the antibody titer was also significantly decreased (Nakajima *et al.*, 2004).Compatible with our finding concerning no difference between the IgG antibody titers against H. pylori between control group and HD patients , in a study conducted by Davenport *et al.* (1991) on 76 patients with end-stage renal failure who were receiving regular hemodialysis found the prevalence of H. pylori IgG antibodies did not differ significantly from that in 247 age-matched healthy controls. In this study also hemodialysis patients who were positive for H. pylori IgG antibodies were older compared to those patients without H. pylori antibodies (Davenport *et al.*, 1991). To consider the IgG antibodies against Helicobacter pylori in hemodialysis patients in comparison with a population of patients suffering from non-ulcer dyspepsia and healthy blood donors, Loffeld *et al.* (1991) showed that in the younger age groups the presence of antibodies was low and there was an increasing prevalence of antibodies with rising age (Loffeld *et al.*, 1991).In contrast to above two studies we could not show any association between age and H. pylori infection in our patients. In a study on two hundred and one patients with dyspeptic complaints consisted of 47 hemodialysis and 100 non-renal disease patients, Ozgur *et al.* (1997) showed that the H. pylori prevalences among the two groups were not significantly differ and

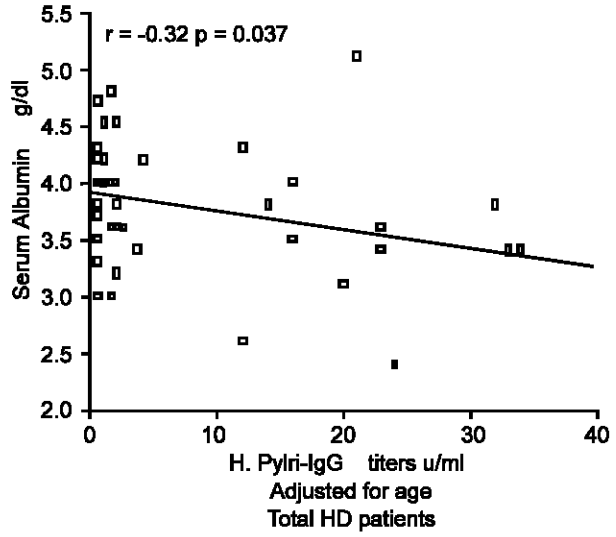

Fig. 1: Significant inverse correlation of helicobacter IgG antibody titer with serum albumin.

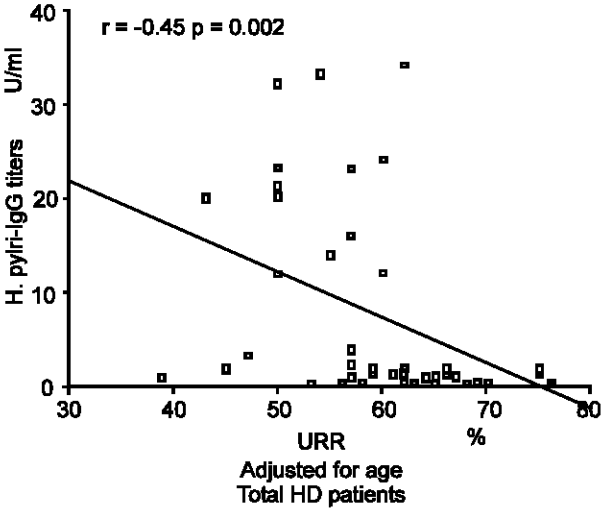

Fig. 2: Significant inverse correlation of helicobacter IgG antibody titer with dialysis efficacy.

the prevalence of H. pylori infection did not correlate with the hemodialysis duration (Ozgur *et al*., 1997). To investigate the Helicobacter pylori antibodies in hemodialysis patients, Yildiz *et al*. (1999) considered forty-seven dialysis patients (22 male, 25 female, mean age of 36.6±15 yr) and 55 healthy individuals (34 male, 21 female, mean age of 33.4±9.6 yr) and found no significant difference of H. pylori infection was existed between the study groups, also patients with H. pylori antibodies spent a shorter time on dialysis compared to patients without the antibodies (Yildiz *et al*., 1999).Although studies conducted by Ozgure *et al*. (1997); Yildiz *et al*. (1999) and Davenport *et al*. (1991) and our finding show that in hemodialysis patients the prevalence of H. pylori is not more than in patients with normal renal function, the findings of decreasing the proportion of H. pylori-antibody titer with the duration of dialysis by Nakajima and no correlation of the prevalence of H. pylori infection with the hemodialysis duration by Ozgur *et al*. (1997) and the finding of Yildiz *et al*. (1999) that showed patients with H. pylori antibodies spent a shorter time on dialysis compared to patients without the antibodies and also our finding that the male hemodialysis patients had a near significant positive correlation of Helicobacter IgG antibody with duration of hemodialysis treatment are have some discrepancy. We concluded that, the only dialysis duration may not be completely a sufficient factor to describe the association of dialysis and H. pylori antibody titers. While we showed the inverse correlations of Helicobacter IgG antibody with hemodialysis dosage as well as inverse correlations of Helicobacter IgG antibody with serum albumin and also with dialysis efficacy as well as a positive correlation of Helicobacter IgG antibody with duration of hemodialysis treatment altogether show firstly the association of H. pylori infection with malnutrition and secondly show that insufficient and low adequate hemodialysis may predispose to H. pylori infection especially in chronically long term hemodialysis patients. We propose to more investigation of the association of H. pylori infection with hemodialysis parameters to have a better concept in this aspect of dialysis patients.

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