Particularities of Helicobacter pylori Infection in Diabetic Patients

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Introduction: In the last few years many studies were focused on the implications of Helicobacter pylori infection in the evolution of patients with diabetes mellitus. Most of the results are controversial. Our aim was to study the prevalence of the bacterial infection and some of its epidemiological features in diabetic versus non-diabetic patients and the particularities of the association of Helicobacter pylori with diabetes mellitus.

Material and method: We studied 70 consecutive patients with dyspeptic syndrome evaluated with The Leeds Dyspepsia Questionnaire, divided in 2 groups: 35 diabetic and 35 non-diabetic patients.

Results: The prevalence of the Helicobacter pylori infection was similar in our groups ($p > 0.05$). Inside each group, the prevalence of bacterial infection did not differ related to the determination method – serology vs. invasive test ($p > 0.05$). In the diabetic patients we found a positive correlation between the bacterial infection and parameters like family size (>5) ($p < 0.01$). The metabolic control of the diabetics was not influenced by the infection. Regarding diabetes complications, there is significant association of neuropathy with Helicobacter pylori. The eradication rate of infection was similar in diabetic and non-diabetic groups.

Conclusions: The prevalence of Helicobacter pylori infection did not differ in diabetics versus non-diabetics. Both determination methods proved similar efficacy for bacterial diagnosis, but is recommended an association of an indirect and a direct method. The bacteria did not influence the glycemic status. Neuropathy is strongly associated with Helicobacter pylori infection.

Keywords: diabetes mellitus, Helicobacter pylori, diabetic neuropathy, dyspeptic syndrome

Introduction

There are some studies published over the last years regarding the possible role of Helicobacter pylori (HP) infection in either type 1 or type 2 diabetes mellitus (DM), but data about the prevalence of this bacteria among patients with DM are still scanty and controversial [1]. Some authors reported higher prevalence of HP infection among diabetic patients [2,3], but others concluded that there is no statistically significantly difference regarding the prevalence of HP infection in diabetic patients versus non-diabetic controls [4,5]. The glycemic control seems to be influenced by the bacterial infection [6], while other results do not confirm this affirmation [7,8]. The standard triple therapy appears not to be sufficient to eradicate the infection efficiently in insulin-dependent DM patients [5,9].

The aims of this study are: 1) to investigate the prevalence of HP infection in patients with DM; 2) To establish the involvement of the bacterial infection in metabolic glycemic control and DM complications; 3) Evaluation of the eradication rate of HP infection using the first-line triple therapy.

Material and method

A group of 35 consecutive patients with upper gastrointestinal symptoms and type 1 or type 2 DM and 35 consecutive non-diabetic subjects with dyspeptic syndrome were enrolled in the study. The non-diabetic group included patients with upper gastrointestinal symptoms within gastro-esophageal reflux disease, functional dyspepsia, chronic hepatitis, biliary lithiasis. Each patient completed a validated questionnaire based on The Leeds Dyspepsia Questionnaire (scores from 0 to 72) to obtain information about the presence and severity of upper gastrointestinal tract symptoms. All patients underwent upper gastrointestinal endoscopy with biopsy specimens obtained from gastric antrum and corpus. HP status was evaluated in each patient by the rapid urease test (RUT) and by serological enzyme-linked immunosorbent assay (ELISA) for anti-HP IgG antibodies. Blood samples were also obtained for detection of glycated hemoglobin (HbA1c) levels. The data about DM complications were obtained from the registration and evolution files of each patient in the Territorial Anti-Diabetic Centers.

Results

Gender distribution showed a preponderance of female gender in both groups (54% in the diabetic patients group and 63% in the control group), without statistically significantly difference ($p > 0.05$).

The mean age of the diabetics was 52.6 years, while the patients in the non-diabetic group had ages between 27 and 66 years, with a mean age of 44.08 years. Although the mean age was greater in the diabetics group, there is no statistically significant difference between groups ($p > 0.05$).

In terms of medium of provenience we have noticed that in both groups most of the patients were born or lived

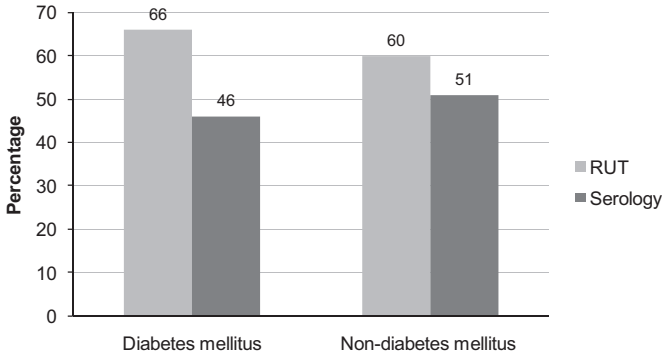

Fig. 1. The prevalence of HP infection related to the identification method

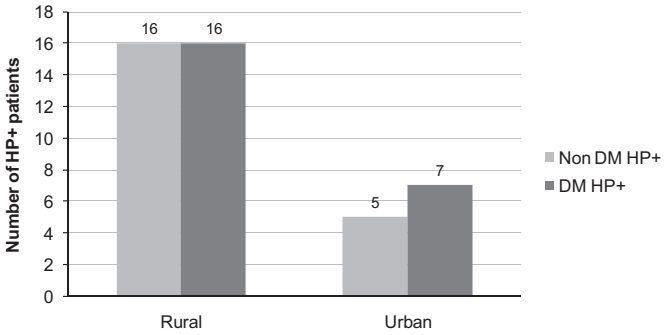

Fig. 2. The frequency of HP infection related to the medium of provenience, diabetics vs. non-diabetics

their first ten years of life in the rural area (63% patients in the diabetics group and 51% in the controls group (p >0.05).

HP infection assessment was made by a noninvasive method (the serological determination of HP antibodies) and by an invasive one – superior gastro-esophageal endoscopy with the RUT.

Serological tests for detection of anti-HP antibodies were positive in 46% patients with DM and in 51% non-diabetics. The RUT revealed the presence of the bacteria in biopsy specimens in 66% cases in the DM group and in 60% patients from the non-diabetics group (Figure 1).

In both groups, the serological determination of HP infection proved many false-negative results, especially in the diabetics (20% diabetic patients vs. 11% non-diabetic patients). These differences are congruent with the considerations of the consensus group that serology has a limited role in HP diagnosis.

The prevalence of HP infection was similar in our groups (p >0.05), regardless of the determination method (p >0.05).

There is no statistically significant difference between patients with HP infection in both groups related to the medium of provenience (p >0.05), but we remark that in the urban area the bacteria was found especially in the diabetics (Figure 2).

Some studies found that family size (number of household members) during childhood is associated with HP infection. In both groups the infection with HP was detected especially in those subjects who declared a family size of more then 5 members (p >0.05) (Figure 3).

The particularities of the DM group

Most of the diabetic patients had insulin-dependent type 2 diabetes (49%), probably related with a greater rate of chronic diabetes-related complications, especially diabetic gastroparesis with dyspeptic syndrome, which lead to frequent hospitalization of these patients.

We observed that the HP infection was found in the insulin-dependent type 2 DM patients (44%) and that all type 1 DM patients associated the infection. The bacterial infection was not correlated with the DM type (p >0.05) (Figure 4).

In the DM group, 70% of patients with HP infection have lived their first 10 years in the rural area (p >0.05) (Figure 5).

Regarding the number of family members during childhood, 65% of the diabetics with HP infection declared a size family greater than 5 (p <0.01). In our group family size during childhood proved to be a risk factor for the infection (Figure 6).

Most of the diabetics did not smoke and did not affirm chronic alcohol consumption. A possible explanation could be the presence of DM and its progressive complications (neuropathy, arteriopathy) which required at least smoke cessation. The infection with HP was found in 75% smoker patients and in all chronic alcohol drinkers. There is no statistically significant association between smoking

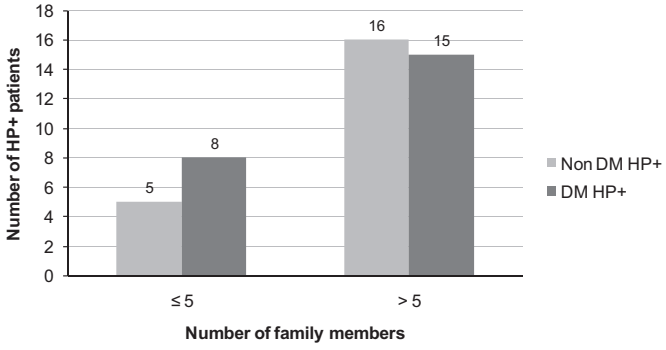

Fig. 3. The frequency of HP infection related to family size during childhood, diabetics vs. non-diabetics

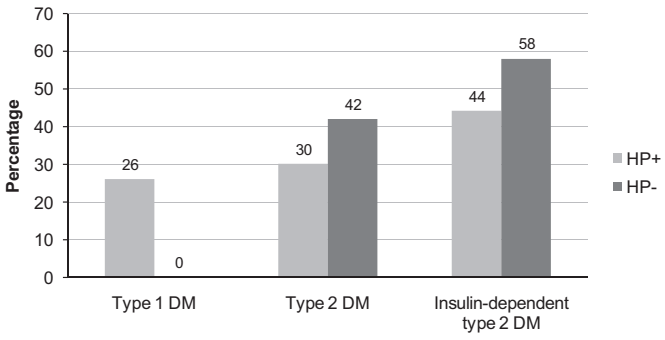

Fig. 4. The frequency of HP infection related to the type of DM

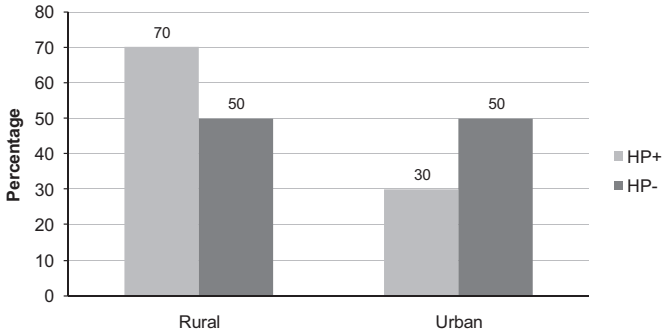

Fig. 5. The frequency of HP infection related to the medium of provenience

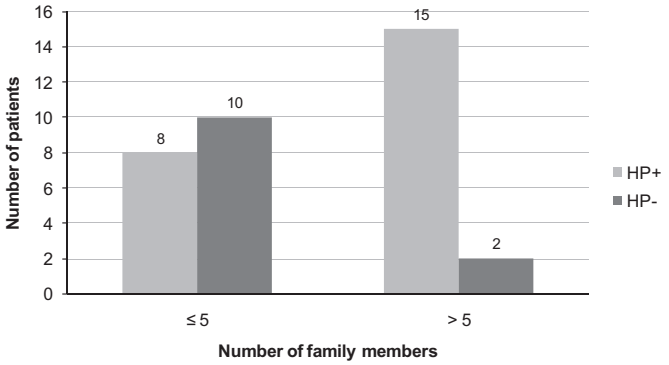

Fig. 6. The frequency of HP infection related to family size during childhood

and chronic alcohol drinking with HP infection (p >0.05) (Figures 7, 8).

The role of HP infection in the metabolic control of DM is a controversial issue. For assessing the glycemic control in our diabetic patients we have evaluated the HbA1c levels and the presence of diabetic chronic complications.

Most of the patients had a HbA1c value between 7–8%, with a mean value of 8%, representing an unsatisfactory glycemic control. We found a greater HbA1c mean value in the HP positive diabetics (8.5%) compared with the HP negative subjects (7.5%). These data suggest an inadequate glycemic control in the infected diabetics, with no statistically significant association with the bacterial infection (Figure 9).

The diabetic patients have been previously diagnosed with chronic diabetic complications: the most frequent complication in our group was neuropathy (49%) and only 6% suffered from nephropathy (Figure 10).

We observed a rate of HP infection of 76% in the diabetic patients with neuropathy and of 67% in the diabetic patients with retinopathy. The statistic analysis found a significant association of neuropathy with HP infection (p <0.05), but no relation between retinopathy and the bacterial infection (p >0.05) (Figure 11).

The eradication of the bacterial infection after the first line triple therapy was evaluated by the RUT 4 weeks post-treatment. There was an eradication rate of 76% in the non-DM group and 65% in the DM group, but the difference is not significant statistically (p >0.05) (Figure 12).

Discussions

Both groups were demographically similar, with a preponderance of women, matched for age and medium of provenience, that allows statistical comparative analysis.

Hamed et al. found a higher prevalence of HP infection in diabetic patients compared to healthy controls [2,3]. Two studies carried out in Romania reported a similar prevalence of the bacterial infection in diabetic versus non-diabetic patients [4,5]. We obtained the same result (p >0.05), probably because of the inheritance of infection in childhood, before the DM onset.

Kim et al. found that the RUT has a higher rate of detecting HP infection than serology [10] and Pandya et al. suggested that the association of RUT with serology is the best choice for confirming the diagnosis due to its high concordance rate, the high sensitivity of serology and high specificity of RUT [11]. In our study, the prevalence of bacterial infection did not differ related to the determination method (p >0.05).

Rural provenience and a family size greater than 5 (both during the first ten years of life) were related with the bacterial infection in our groups.

The particularities of the DM group

A study by Bener et al. suggests that there is a significant association between HP infection and type 2 DM [3], but a sero-epidemiological investigation conducted on a random sample of patients obtained from the Multiethnic Study

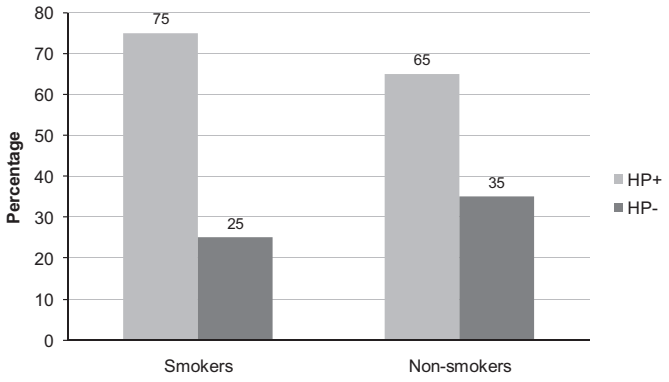

Fig. 7. The frequency of HP infection related to the smoker/non-smoker status

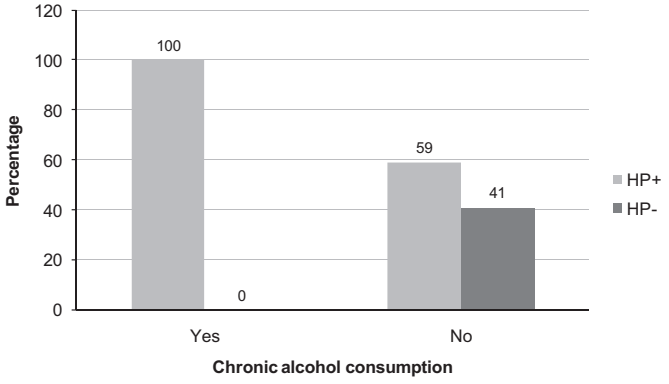

Fig. 8. The frequency of HP infection related to chronic alcohol consumption

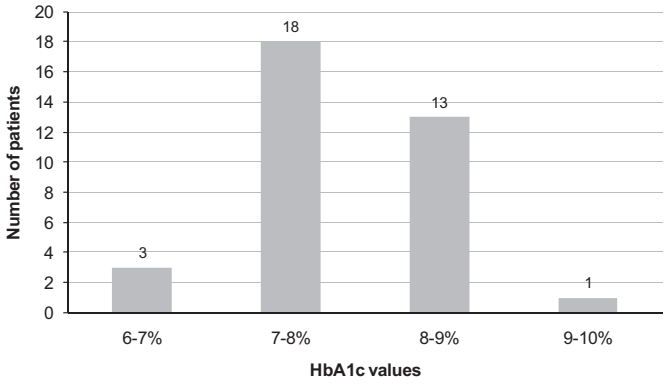

Fig. 9. The distribution of HbA1c values

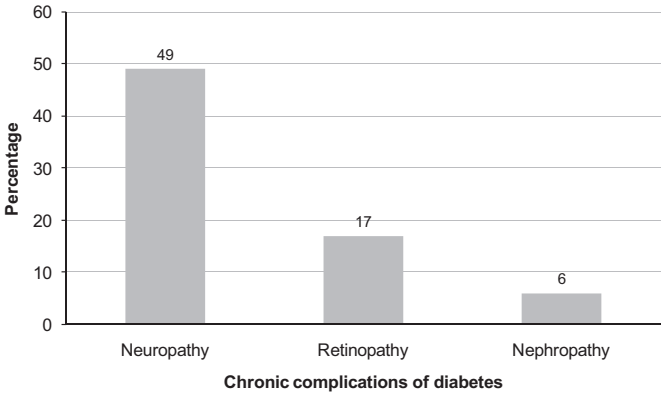

Fig. 10. The frequency of chronic complications of diabetes

of Atherosclerosis (MESA) did not show an association between HP infection and type 2 DM [7], confirming a previous study by Demir et al. [8], results that are congruent with our findings.

Sykora et al. found after multivariate analysis that a family size greater than two is significantly associated with infection [12,13,14], but others concluded the contrary [15,16]. Celinski et al. suggest a high prevalence of infection in those born in rural areas [17]. In our diabetic group, only the family size greater than 5 during childhood can be considered risk factors for HP infection.

In a large cross-sectional survey of adults in the United Kingdom, smoking was significantly associated with positive HP serology [18], but a study of German patients in a general practice found no significant relation between smoking and active HP infection and a protective effect of alcohol consumption against active infection with HP [19]. In our studied DM group there was no statistically significant association between smoking and chronic alcohol consumption with HP infection.

Fernandini-Paredes et al. found that in diabetic patients, HbA1c levels were higher in infected than in uninfected individuals [5] and others did not show an association between HP infection and type 2 DM [4,5]. Our results also suggest no relation between this bacterial infection and DM.

Our study emphasized that HP-infected diabetic patients had a significantly higher incidence of neuropathy, observation congruent with Demir et al. study results that affirm a statistically significant correlation between H. pylori infection and the presence of neuropathy [8].

Gasbarrini et al. and Ciortescu et al. found a lower rate of eradication of the HP infection in diabetic patients versus non-diabetic subjects [5,9]. In our study the eradication rate of HP infection after first line triple therapy was similar in DM and non-DM groups.

Conclusions

1. The prevalence of HP infection did not differ in diabetic versus non-diabetic patients, probably because of the inheritance of the bacterial infection during childhood, before the onset of DM.
2. For the diagnosis of the infection it is recommended to associate an indirect and a direct method of identification of HP.
3. In our DM group, family size greater than 5 during childhood can be considered a risk factor for HP infection.
4. The bacterial infection does not influence the glycemic control in DM patients.
5. Diabetes related neuropathy is correlated with HP infection.
6. The eradication rate of infection was similar in DM and non-DM groups.

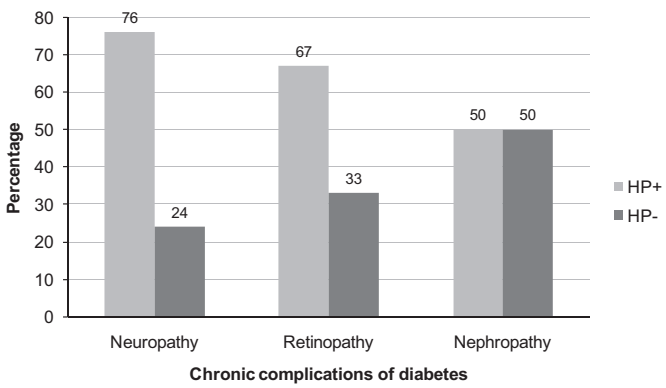

Fig. 11. HP infection related to the chronic complications of diabetes

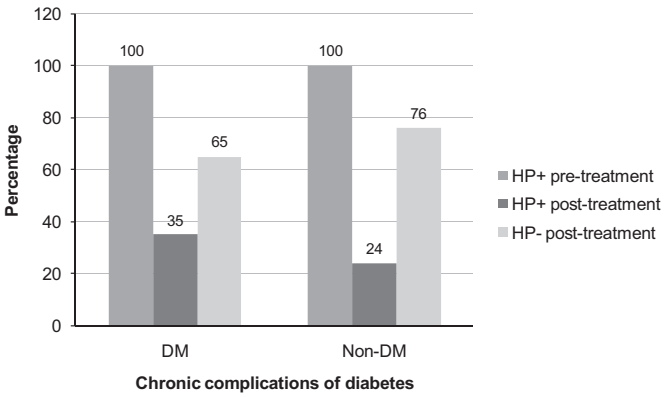

Fig. 12. The eradication rate of HP infection after first-line therapy

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