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Journal of Cystic Fibrosis 12 (2013) 761 – 765

Journal of Cystic Fibrosis

www.elsevier.com/locate/jcf

Original Article

Prevalence of *Helicobacter pylori* infection in patients with cystic fibrosis

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Received 15 June 2012; received in revised form 7 January 2013; accepted 8 January 2013
Available online 1 February 2013

Abstract

Introduction: Helicobacter pylori (*H. pylori*) is one of the most common bacterial infections worldwide. The prevalence of *Hp* infection in cystic fibrosis (CF) is unclear. Thus, the aim of our study was to determine the prevalence of *H. pylori* infection in CF patients and to correlate *H. pylori* presence with CF expression.
Material and methods: The presence of *H. pylori* infection was assessed using a breath test with isotope-labeled urea in CF 79 patients compared to 302 healthy control subjects (HS).
Results: Fifteen (19.0%) CF patients were *H. pylori* positive. No statistical differences in the basic clinical parameters or in their distribution were documented. No clinical factor was an independent risk factor of *H. pylori* infection. The corrected prevalence of *H. pylori* infection in pediatric CF patients and HS was 14.4% and 9.8%, respectively.
Conclusion: The prevalence of *H. pylori* infection in CF patients is not different from that in healthy subjects.

Keywords: Prevalence; *Helicobacter pylori*; Cystic fibrosis; Epidemiology

1. Introduction

Helicobacter pylori (*H. pylori*) is one of the most common chronic bacterial infections world-wide [1]. However, the prevalence of *H. pylori* infection is not homogeneous. In Western countries, the prevalence of *H. pylori* infection has been decreasing during the past few decades [2,3]. Nowadays, the prevalence of *H. pylori* infection in European studies varies between 7% in asymptomatic children in the Czech Republic and 33% in Northern Norway [4,5]. In Poland, during 2005–2006, *H. pylori* infection was diagnosed in 15.7% of children [6]. There was no difference in the mean age of the infected and the non-infected children.

H. pylori infection is acquired early in life and in the absence of antibiotic therapy, it generally persists for life. It is widely accepted that *H. pylori* infection is one of the main etiological factor for gastritis and peptic ulcer disease. Its eradication is

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1569-1993/$ -see front matter
http://dx.doi.org/10.1016/j.jcf.2013.01.004

associated with ulcer healing and reduction of ulcer recurrence. Corpus gastritis is associated with a reduction in gastric acid, multifocal gastric atrophy and an increased risk of gastric cancer [7–10]. However, there are only few studies assessing prevalence of *H. pylori* infection in patients with cystic fibrosis (CF). Moreover, the results of these studies are sparse and contradictory [1,11–13].

Przyklenk et al. documented that prevalence of serum IgG antibodies against *H. pylori* was the same in CF patients and in the non-CF group [11]. The authors emphasized that frequency and length of prophylactic use of antibiotics did not decrease the prevalence of elevated serum antibodies against *H. pylori*, although the majority of antibiotics usually given to CF patients show a high in vitro activity against *H. pylori*. On the contrary, Littlewood et al. found an increased prevalence of *H. pylori* in the CF population [12]. Yahav et al. reported that the prevalence of *H. pylori* infection in CF patients (aged 1–44) was lower (16.6%) than in the age-matched non-CF controls (30.0%) assessing the *H. pylori* antigen by using specific monoclonal antibodies in stool specimens [13]. However, the observed difference was not statistically significant (p=0.118). Clearly, different tests have been previously used to determine the prevalence of *H. pylori* infections in CF patients. The serum test has been criticized not to predict an active infection.

2. Aim

The aim of the study was to determine the prevalence of *H. pylori* infection in CF patients.

3. Material and methods

The study population consisted of 79 CF patients (38 males & 41 females) 2 to 39 years of age, who did not receive intravenous or oral antibiotics (with the exception of azithromycin) or proton pomp inhibitors (PPI) for 3 months prior to the investigation.

The control group consisted of 302 healthy subjects, 3–18 years of age, who did not receive intravenous or oral antibiotics or PPIs for four weeks prior to the investigation. The investigation was part of the project PL0361 "Good diagnosis – treatment – life" by the First Specialist Clinical Hospital in Zabrze evaluating the incedences of gastrointestinal diseases in randomly selected children [14].

The genotypes of the studied CF patients were as follow: F508del/F508del (n=36), F508del/− (n=14), F508del/2143delT (n=3), F508del/CFTRdel2,3 (21 kb) (n=2), F508del/2183AA>G (n=3), F508del/3849+10kbc>T (n=2), F508del/1717-1G-A (n=2), F508del/N1303K (n=1), F508del/3272-26A>G (n=1), F508del/3659delC (n=1), F508del/G1244E (n=1), F508del/G542X (n=1), F508del/R553X (n=1), G542X/− (n=2), N1303K/− (n=1), N1303K/3272-26A>G (n=1), R533X/− (n=1), 3849+10kbc>T/− (n=1), non detected −/− (n=5) [15].

In all CF patient's *Z-score* for body height and weight, fecal elastase-1 concentration, serum alanine aminotransferase (ALT) and aspartate aminotransferase (AST), International Normalized Ratio (INR) and frequency of *Pseudomonas aeruginosa* (*P. aeruginosa*) colonization were assessed. FEV1 was determined in subjects older than 6 years (Table 1). In patients with fecal elastase-1 concentrations higher than 100 μg/g, fecal fat excretion was determined to prove pancreatic sufficiency [16,17]. In addition, the socioeconomic status (urban or rural region) and genotype of CF patients were assessed.

The presence of *H. pylori* was assessed in all subjects using the ^{13}C isotope-labeled urea breath test (UBT). The test was performed after a minimum fast of 6 h. Two breath samples were collected as baseline and 30 min after swallowing (drinking) a 200 ml of orange juice drink which contained 50 mg of ^{13}C-labeled urea. To collect the breath samples, 650 ml aluminized bags connected to one-way valves were used. Measurement of the $^{13}CO_2/^{12}CO_2$ ratio was carried out using an ^{13}C-infrared isotope analyser system (IRIS, Wagner Analysen Technik, Bremen, Germany) with a cut-off value of delta over baseline (DOB)=4‰ [18].

The relationship between clinical status and *H. pylori* infection was assessed in all CF patients. The comparison of the prevalence of *H. pylori* infection in CF population (n=72) and healthy age matched subjects is depicted in Table 2.

4. Statistical methods

The comparison of the clinical parameters in patients with/without *H. pylori* infection was performed using the Mann–Whitney test. The difference in distribution of the *H. pylori* status between groups with different genotypes, with/without *P. aeruginosa* colonization, pancreatic sufficiency/insufficiency and socioeconomic status was analyzed by the χ^2 test. The influence of clinical parameters on the presence/absence of *H. pylori* infection was determined with the use of the logistic regression analysis. P value <0.05 was considered statistically

Table 1
Clinical and demographic data of CF patients.

Clinical parameters	All CF patients	Pediatric CF patients
Age [years] median (1–3 quartile)	13.6 (8.0–17.2)	10.3 (6.6–15.3)
Sex Males/females	38/41	29/33
Z-score for body height median (1–3 quartile)	−0.84 (−2.21–0.60)	−0.86 (−2.28–0.01)
Z-score for body weight median (1–3 quartile)	−0.86 (−1.47 to −0.43)	−0.89 (−1.48 to −0.34)
ALT [U/l] median (1–3 quartile)	25.0 (19.0–34.0)	25.5 (19.0–32.2)
AST [U/l] median (1–3 quartile)	31.0 (23.0–40.0)	31.0 (24.0–40.2)
INR median (1–3 quartile)	1.05 (1.02–1.12)	1.06 (1.02–1.12)
FEV1 [%] median (1–3 quartile)	71.5 (47.2–88.5)	72.0 (52.0–95.0)