

Current prevalence of *Helicobacter pylori* infection in patients with dyspepsia treated in Warsaw, Poland

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Abstract

Introduction: The prevalence of *Helicobacter pylori* (Hp) infection in patients with dyspepsia has important clinical and epidemiological implications. However, the current prevalence of Hp infection among patients within Poland is unknown; the last data were collected a decade ago and the majority of previous studies showed the prevalence to be between 60% and 100%.

Aim: To establish the current prevalence of Hp infection among patients with dyspepsia in Warsaw, Poland.

Material and methods: The study group comprised 148 patients (126 women and 22 men) with dyspepsia, treated in two outpatient clinics in Warsaw. The mean age in the group that tested positive for Hp was 45.8 years (SD = 14.86; median = 51; min = 19; max = 64). They were tested for Hp infection with a urea breath test that uses ¹³C-enriched urea and isotope ratio mass spectrometry.

Results: *Helicobacter pylori* infection was found in 53 patients (44 women and 9 men), i.e. in 35.8% of the whole study group. We did not find any significant relationship between Hp infection and the patients' age, gender, or their body mass index.

Conclusions: The current prevalence of Hp infection among patients with dyspepsia treated in Warsaw is 35.8%. However, our data suggest almost a two-fold fall in the prevalence of Hp infection compared to the previous Polish studies.

Introduction

Dyspepsia is defined as a chronic or recurrent upper-abdominal discomfort or pain [1–3]. There are two types of dyspepsia: organic and functional. The main causes of organic dyspepsia are: gastroesophageal reflux, chronic peptic ulcer disease, and malignancy [4, 5]. Among the pathogenic factors of functional dyspepsia are: genetic predisposition, *Helicobacter pylori* (Hp) infections, inflammation, and psychosocial factors. Currently, it is assumed that lack of clinical improvement after successful eradication treatment in Hp-infected dyspeptic patients is indicative of functional dyspepsia, while reduction of symptoms as a result of the treatment suggests Hp-associated dyspepsia, which is a type of organic dyspepsia. Eradication treatment is a first-line treatment for Hp-infected dyspeptic patients [6, 7]. Known as “test and treat”, the current guidelines for dealing with dyspeptic patients recommend testing for Hp infection. In Hp-in-

ected patients below 50 years of age who do not display alarming symptoms nor have a family history of gastrointestinal cancer eradication treatment is recommended. It should also be administered in Hp-infected patients in regions where the prevalence of Hp is at least 10% of the population. In patients with alarming symptoms and older than 55 years, a gastroscopy should be carried out [8, 9].

The prevalence of dyspepsia in the total population is high and reaches 34%, according to Castillo's US-based study [10].

The current prevalence of Hp infection among patients within Poland is unknown; the last data were collected a decade ago and the majority of existing studies tested the general population.

Aim

The aim of the present study was to establish the current prevalence of Hp infection in patients with

dyspepsia treated in Warsaw (Poland) using the urea breath test (UBT).

Material and methods

The study group comprised 148 patients (126 women and 22 men) with dyspepsia. The mean age in this group was 46 years (SD = 14.45; median = 50; min = 19; max = 64). All subjects were treated in the Clinic of Gastroenterology of the Central Clinical Hospital of the Ministry of Internal Affairs in Warsaw and the Department of Dietetics, Faculty of Human Nutrition and Consumer Sciences, Warsaw University of Life Sciences. Prior to the study, all subjects gave informed consent to take part in the study by signing an appropriate form. The Regional Ethical Review Board of the Clinical Hospital of the Ministry of Internal Affairs (Warsaw, Poland) approved the study, and it was performed according to the guidelines of the Declaration of Helsinki 1975.

The subjects were tested for Hp infection with the UBT that uses 75 mg ^{13}C -enriched urea containing 99% of atoms of carbon-13, produced by INFAL (Bochun, Germany), which was dissolved in 200 ml of orange juice. Breath samples were taken in two capped breath containers before drinking the test solution and 30 min after. Thus, four breath samples were taken altogether, two being control samples. The samples were evaluated in isotope ratio mass spectrometry (IRMS) using an Automated Breath Carbon Analyser produced by Sercon (UK). A result was considered positive, i.e. indicative of the infection, when the increase of $^{13}\text{CO}_2$ in the breath was > 4% compared to the baseline value [11, 12].

Statistical analysis

The prevalence of Hp infection was calculated as a proportion of patients who scored positive in the urea breath test (UBT), relative to all patients participating in the study. For additional (control) statistical analy-

ses, we used IBM SPSS software (version 22, Armonk, NY: IBM Corp.). In all tests, we considered values below 0.05 to be statistically significant. The spectrometer was properly certified by competent authorities.

Results

Helicobacter pylori infection was found in 53 patients (44 women and 9 men), i.e. in 35.8% of the study group, comprising 148 people. This principal finding was followed by additional statistical analyses aiming to establish whether certain factors (i.e. age, body mass index, and gender) were significantly related to the prevalence of Hp infection. We did not expect such effects to occur; the character of these additional analyses was mainly exploratory.

The mean age in the group that tested positive for Hp was 45.8 years (SD = 14.86; median = 51; min = 19; max = 64). In turn, the mean age of the patients that proved to be Hp negative was 46.1 years (SD = 14.29; median = 48; min = 21; max = 64). We wanted to check whether there was a systematic difference between infected and uninfected groups in terms of age. The Shapiro-Wilk test showed that the participants' age deviated from the normal distribution ($p < 0.005$). That is why we used a non-parametric Mann-Whitney U test to analyse these data. We found that the age of the Hp-positive group did not differ significantly from the age of the Hp-negative group ($U = 1652.5$; $n_1 = 46$; $n_2 = 72$; $p = 0.99$; two-tailed). We also broke down the study group by age and tested whether the participants' age was significantly related to Hp prevalence. The χ^2 test used to analyse these data did not show any significant relationship between infection prevalence and five different age-ranges ($\chi^2 = 4.12$; $p = 0.39$; $N = 117$; $df = 4$). It is noteworthy that the < 20-year-old group was excluded from the above analysis due to the number of subjects being too low (Table I).

The average BMI in patients with Hp infection was 25.2 kg/m² (SD = 3.83; median = 24.9; min = 17.6; max = 32.7), whereas in the group without Hp it was 25.2 (SD = 4.96; median = 24.35; min = 16.8; max = 39). The Shapiro-Wilk test showed BMI did not deviate significantly from the normal distribution ($p > 0.07$), so a two-sample t -test (two-tailed) was used to analyse these data. The BMI of patients in the infected group did not differ significantly from the BMI of patients from the uninfected group ($t_{111} = 0.12$; $p = 0.91$).

Finally, we checked whether Hp infection significantly depended on the patients' gender. In the Hp positive group there were 44 females and 9 males, whereas in the Hp negative group there were 82 females and 13 males. There was no significant relationship be-

Table I. The prevalence of *Helicobacter pylori* (Hp) infection in different age brackets

Age [years]	Hp present N = 53	Hp absent N = 95	Percent of subjects infected
18–19	1	0	Proportion not calculated due to low number of subjects
20–29	10	16	38.5
30–39	5	9	35.7
40–49	4	12	25
50–59	17	16	51.5
60–69	9	19	32.1

tween Hp infection and the patients' gender ($\chi^2 = 0.29$; $p = 0.59$; $N = 148$; $df = 1$).

Discussion

The aim of this study was to establish the current prevalence of Hp infection among patients with dyspepsia in Warsaw (Poland), using the UBT. In a group of 148 patients, we found that 35.8% tested positive for Hp.

Helicobacter pylori infection is one of the most common infections in the world but its transmission is not even across different parts of the globe. Studies conducted in highly developed countries revealed a similar or lower prevalence of Hp infection as compared with our findings. In a Dutch serologic study the prevalence of Hp infection in blood donors was 31.7% [13]. In Cyprus, a PCR study revealed the prevalence of Hp infection in subjects with dyspepsia to be 39.8% [14]. In Belgium, Hp infection was found in only 17% of patients with dyspepsia [15]. A similar prevalence rate was revealed in a group of people with dyspepsia in Denmark [16]. In a British study, serologic features of Hp infection were discovered in 37% of dyspepsia patients in primary care [17]. Nandurkar *et al.* (Australia) established the prevalence of Hp in subjects with dyspepsia at only 15.4% [18]. In contrast, the prevalence of Hp infection in patients with dyspepsia in developing countries is significantly higher, reaching 86% in Bhutan [19], 75.5% in Morocco [20], 76.5% in Kazakhstan [21], and 62% in India [22]. Thus, it may be assumed that as a country develops economically and improves its hygiene, the prevalence of the infection decreases.

Studies carried out previously in Poland revealed a very high prevalence of Hp infection (~75%; see Table II), much higher than in highly developed European countries. For example, in the study published by Piotrowicz *et al.* [23], the prevalence of Hp infection in pa-

tients with dyspepsia was 69.8%, which is much higher than in our study group. The study examined a different population, of the region of Olsztyn in Poland, which is a smaller city located in a mostly rural area, and the material was collected in 2003–2005. Studies by Celiński *et al.* [24] suggest that the smaller the town or village of the subjects' residence, the higher the prevalence of Hp infection. The studies, carried out in 2000–2003, showed a higher prevalence of Hp infection in towns (95%) than in cities (74%), with the prevalence of Hp infection in Warsaw standing at almost 88%. A lower prevalence of Hp-dependant gastritis in patients with functional dyspepsia, i.e. 54.9%, was found in a 1999 multi-centre study [25]. In turn, a 2004 study by Łasiewicz discovered the prevalence at c. 88% in a sample of c. 500 Warsaw residents and a similar rate, i.e. 84%, in other parts of Poland [26]. Matysiak-Budnik *et al.* [27] observed a similar infection prevalence rate in healthy subjects in the region of Lower Silesia. According to the paper, the prevalence of Hp infection in adults was 80–100%, and decreased in younger subjects. The study was published in 1999 and its results already suggested a future fall in prevalence [25]. A decreasing tendency in the prevalence of Hp infection in children was also shown by Krusiec-Świergoł *et al.* [28], who found it to be 15.7% in children of the Silesia region, while in previous studies, conducted around 2002 by Iwańczyk *et al.*, the prevalence in children had been close to 30% [29]. Together, the above reports suggest that (i) 10–20 years ago the prevalence of Hp infection in Poland was very high (~75%), and (ii) that there already was a trend towards lower prevalence in younger generations. A comparison of results for the Polish population over time are shown in Table II. Compared to previous Polish studies, we found an almost two-fold fall in the prevalence of Hp infection. In fact, our result is close to

Table II. Results of different studies on the prevalence of *Helicobacter pylori* (Hp) infection in adults

Year of publication	Prevalence of Hp infection	Description	Test applied
1996 [27]	80–100% (depending on subjects' age)	General population; Lower Silesia	Serologic tests
1999 [25]	Around 55%	Patients with dyspepsia and gastritis; multi-centre study	Urease test + histopathological examination
2004 [26]	Around 88%	General population; Warsaw, multi-centre study	Serologic test
2006 [24]	95% (towns), 74% (cities)	General population; Lublin region	Serologic test
2013 (material collected in 2003–2005*) [23]	69.8%	Patients with dyspepsia, Olsztyn region	CLO test
2015	35.8%	Patients with dyspepsia; Warsaw	13C-urea breath test

*Information obtained verbally.

the prevalence rates reported in highly developed countries. The findings are also in line with the decreasing trend in prevalence rates for Hp infection across Europe discovered in a meta-analysis [30], which did not include Poland due to a lack of available data.

The present study focused not on the general population but on a group of patients with dyspepsia treated in two specialist clinics in Warsaw, a city whose residents' material status is higher than in the rest of the country. Our findings might also have been affected by the research method applied. The UBT allows diagnosis of a current infection, not one endured in the past, as the serological test does. Another important methodological difference between our research and the previous studies conducted in Poland is the fact that some of them examined healthy subjects, not patients with dyspepsia. The fall in prevalence of Hp infection may also partly result from widely applied eradication treatment and should be associated with a rise in material status and improved quality of nutrition – both well known to limit the transmission of Hp infection – that took place in Poland in connection with an over two-fold hike in GDP per capita in the last 15 years. A strong relationship between high prevalence rates of Hp infection and low socio-economic status has been proven in numerous studies [31, 32]. Nevertheless, the scale of the difference – an almost two-fold decrease – suggests a considerable drop in the prevalence of Hp infection in Poland. This interesting trend needs to be further confirmed in large-scale epidemiological studies on the general population.

Conclusions

The current prevalence of Hp infection among patients with dyspepsia treated in Warsaw is 35.8%, which may suggest a decrease in the frequency of Hp infection in Poland.

Conflict of interest

The authors declare no conflict of interest.

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