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Prevalence of *Helicobacter pylori* and its Association with Extragastric Diseases in a Tertiary Hospital from East Bavaria

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ABSTRACT

Background & Aims: *Helicobacter pylori* (*H. pylori*) infection remains a significant burden in gastroduodenal diseases. However, contemporary data on the prevalence of *H. pylori* infection in Germany are limited. This study aimed to evaluate the current seroprevalence of *H. pylori* infection in the East Bavarian region by analyzing antibody levels in patients presenting to a German University Hospital.
Methods: Serum samples were collected from both inpatients and outpatients of a German University Hospital. *H. pylori* antibody concentrations were measured using a commercially available assay.
Results: The overall prevalence of *H. pylori* infection was 24.8% (78/314), with the highest infection rates observed in individuals aged over 60 years. A significant association was found between *H. pylori* infection and liver cirrhosis, with a prevalence of 36.4% (36/99) in patients with liver cirrhosis compared to 19.5% (42/215) in those without liver cirrhosis (p=0.002). No significant associations were observed between *H. pylori* infection and type 2 diabetes or coronary artery disease.
Conclusions: This study highlights a low prevalence in *H. pylori* seropositivity in the eastern part of Bavaria. In patients with liver cirrhosis, we still see a considerable high prevelance of *H. pylori. The findings underscore the importance of continued surveillance to monitor trends in H. pylori* prevalence and its associations with extragastric diseases.

Key words: *Helicobacter pylori* – prevalence – liver cirrhosis – extragastric diseases.

Abbreviations: *H. pylori: Helicobacter pylori.*

INTRODUCTION

Helicobacter pylori (*H. pylori*) infection is a major risk factor for severe gastroduodenal diseases, which are associated with high morbidity and mortality [1-3]. Nearly half of the global population is infected with this bacterium [4]. However, epidemiological studies conducted over recent decades in various countries have shown a steady decline in *H. pylori* prevalence, with significant variability among different ethnic groups [5, 6]. This decline is primarily attributed to improved living standards and the widespread use of antibiotic eradication therapies.

Besides its role in gastroduodenal diseases, findings concerning the influence of *H. pylori* on various extra-alimentary organs have been described [7, 8]. Among these putative extra-alimentary disorders caused by *H. pylori*, the relationship with metabolic and hepatological disorders remains controversial.

Currently, limited data exist on the prevalence of *H. pylori* infection in Germany, with reported rates ranging from 28% to 48% [9-11]. Notably, no data are available for the southern region of Germany, specifically East Bavaria. To address this gap, we investigated the current prevalence of *H. pylori* infection in East Bavaria by analyzing the seroprevalence overall and in specific extragastric diseases in unselected patients presenting to the gastroenterology and hepatology department of a university hospital.

METHODS

Study Cohort

A total of 314 patients were prospectively enrolled in this study. All patients included in the study were seen as in- or

outpatients at the gastroenterological and hepatological department of the University Hospital of Regensburg, Germany. Between February 2019 and May 2020, a blood sample was taken as part of the routine medical workup. No additional inclusion and exclusion criteria were applied. If laboratory tests were needed, an aliquot of the serum sample was sent to the Central Laboratory of the hospital and separately stored at minus 30°C until analysis. In total, 401 serum samples were collected. Due to multiple recruitments, missing data, or unclear assignment, 87 serum samples were excluded. The study was approved by the local ethics committee and conducted in accordance to the ethical guidelines of the Declaration of Helsinki as revised in 1989.

Determination of *H. pylori* Status

Anti-*H. pylori* IgG and IgA antibodies were analyzed using an *H. pylori* IgG/IgA enzyme-linked immunosorbent assay ([ELISA] Enzygnost®Anti-*Helicobacter pylori* II/IgG/IgA in conncetion with Behring ELISA (BEP) III- System, Siemens, Marburg, Germany) respectively, according to manufacturers'instructions. Based on the presence of *H. pylori*-specific IgG/IgA (10 units per ml [U/ml]), patients were classified as *H. pylori* positive, whereas the absence of both antibodies indicated an *H. pylori*-negative status.

Statistical Analysis

All statistical analyses were conducted using SPSS 22.0 for Windows (IBM SPSS Statistics, IBM Corp., USA). Categorical variables (e.g., gender and distribution of *H. pylori* status) are presented as frequencies, and comparisons were performed using the Chi-square test and Fisher´s exact test. For non-parametric comparisons, the Mann-Whitney U test was applied. A two-sided significance level of $p < 0.05$ was considered statistically significant for all tests.

RESULTS

Of the 314 individuals enrolled in this study, 118 (38%) were women and 196 (62%) were men with a median age of 56.6 years (±15.8 years)). Most of the patients were born in Germany (n=278), while 21 patients had an European background and 11 were born in Russia. The remaining two patients were Africans. Only a minority (n=67; 21%) of the individuals included in the study received a gastroduodenoscopy. Out of those, seven individuals showed a positive *H. pylori* status either in the rapid urease test or histology. No peptic ulcer disease was seen in the individuals that underwent upper gastrointestinal endoscopy.

Overall, 78 individuals out of 314 had a positive *H. pylori* status, resulting in a seroprevalence of *H. pylori* infection of 24.8% for the complete cohort (Table I). The prevalence rates of anti-*H. pylori* IgG/A in males (48/196, or 24.5%) and females (30/118, or 25.4%) were similar and did not significantly differ (p = 0.893). The *H. pylori* seroprevalence showed a rather weak birth cohort effect until the age of 60 years (Table I). The seroprevalence for german individuals was 22.7% and showed no significant difference to individuals with another ethnicity.

Table I. Seroprevalence of *H. pylori* infection

Cohort (age in year)	No. of subjects	*H. pylori*-positive subjects, n (%)
All	314	78 (24.8)
0-19	3	0
20-39	49	6 (12.2)
40-59	116	29 (25)
>60	146	43 (29.5)

Among the study cohort, 99 individuals (31.5%) were diagnosed with liver cirrhosis. In this subgroup, the prevalence of *H. pylori* infection was significantly higher, detected in 36.4% (36/99) of cases, compared to 19.5% (42/215) in patients without liver cirrhosis (p=0.002).

No significant association was observed between *H. pylori* infection and type 2 diabetes. Of the 314 patients, 79 (25.2%) had type 2 diabetes, with *H. pylori* prevalence recorded at 29.1% (23/79) in this group, compared to 23.4% in patients without diabetes (p=0.310).

Similarly, for coronary artery disease, affecting 67 patients (21.3%), *H. pylori* was serologically detectable in 23.9% (16/67) of cases, comparable to 25.1% (62/247) in patients without cardiac disease (p=0.838).

A detailed summary of *H. pylori* prevalence across these extragastric diseases is provided in Table II.

The majority of patients (n=234; 74.5%) included in the study came from a rural region of East Bavaria. Therefore, we analysed if there was a difference in *H. pylori* prevalence between rural and urban population. There was a trend for a higher prevalence of *H. pylori* in rural regions with 26.4% prevalence compared to 20% in urban regions (p=0.295).

DISCUSSION

Globally, there is a declining trend in the seroprevalence of *H. pylori*, and our study reflects this trend [5, 12]. In agreement, the *H. pylori* seroprevalence (24.8%) in the present study was considerably lower than the rate reported in other studies from Germany (44-48%) [9, 11]. However, the prevalence found in our study aligns a trend seen in a study from former East Germany with 28.9% in 2017 [10].

Table II. Seroprevalence of *H. pylori* infection in association with extragastric diseases.

Disease	No. of subjects	No. of *H. pylori*-negative subjects	No. of *H. pylori*-positive subjects	Percentage of *H. pylori* positive	p
Liver cirrhosis	99	63	36	36.4	0.002
Diabetes mellitus	79	56	23	29.1	0.310
Coronary artery disease	67	51	16	23.9	0.838

The reasons behind the declining seroprevalence rate in East Bavaria are unknown, but may reflect a widening of indication for eradication therapy in the last two decades in Germany [13]. In agreement to a trend reported previously, the present study found no gender specific difference in *H. pylori* [10, 14].

Previous reports demonstrated a linear birth cohort effect of *H. pylori* seroprevalence [6, 7, 9, 12-14] in other populations. In our study such an effect was not completely reproducible. Indeed, seroprevalence increased in patients aged between 30 and 40 years compared to rates in those younger than 30 years, while also a slight increase in subjects up to the age of 60 years was observed. The decrease of *H. pylori* seroprevalence in subjects younger than 30 years of age observed in our study is remarkable and most likely related to the major socioeconomic changes that occurred in the last decades in Germany.

One interesting aspect of our study is the association of *H. pylori* infection and extragastric diseases. Over the last decades, more and more evidence is growing that *H. pylori* may interfere with biological processes outside the stomach and influence the occurrence of various extragastric diseases. Its effects outside the stomach may be related to chronic systemic inflammation and molecular mimicker [7, 15, 16]. We were able to confirm an association between *H. pylori* infection and liver cirrhosis as reported in previous studies [17-20]. Further analyses are required to elucidate the association. However, this result is of clinical importance in this vulnerable group of patients as several studies have shown that *H. pylori* infection and treatment can reduce the risk of liver cirrhosis associated complications [21-23]. A limitation of our study is that we cannot provide data about *H. pylori* and metabolic dysfunction–associated steatotic liver disease (MASLD), previously known as non-alcoholic fatty liver disease (NAFLD). This should be addressed in future studies, because treatment for MASLD, other than weight loss is limited and on the other hand the treatment for *H. pylori* infection is well established [24, 25].

In contrast, we were not able to show an association for type 2 diabetes and coronary artery disease [26, 27]. However, *H. pylori* screening and treatment is important in this group of patients as *H. pylori* gastritis and premalignant lesions occurre more frequently in diabetic patients [28].

The major limitations of this study are that socioeconomic factors, such as diet, genetic predisposition, environmental and cultural background were not considered. These are factors, that can affect susceptibility to *H. pylori* infection, and should be included in future studies.

CONCLUSIONS

This study provides updated insights into the seroprevalence of *H. pylori* infection in the population of East Bavaria. The findings reveal a relatively low seroprevalence rate of *H. pylori* in this region. These results can inform and support regional initiatives aimed at *H. pylori* surveillance, prevention, and eradication programs, contributing to improved public health strategies and targeted interventions.

Conflicts of interest: None to declare.

Authors' contribution: M.S. conceived the study analyzed and interpretated the data, drafted the manuscript, and critically revised it for important intellectual content. L.L. was responsible for literature search, ethical approval, acquisition of data, analysis and interpretation of data. S.T., S.R. and P.M. revised the manuscript. M.M. supervised the study. All authors have read and agreed with the published version of the manuscri

REFERENCES

1. Malfertheiner P, Link A, Selgrad M. Helicobacter pylori: perspectives and time trends. Nat Rev Gastroenterol Hepatol 2014;11:628–638. doi:10.1038/nrgastro.2014.99
2. Selgrad M, Meyer F, Malfertheiner P. Helicobacter pylori: short overview on selected data from the history and their value for clinical medicine, in particular, surgery - what does the (general/abdominal) surgeon need to know. Zentralbl Chir 2014;139:399–405. doi:10.1055/s-0034-1368631
3. Loor A, Dumitrașcu DL. Helicobacter pylori Infection, Gastric Cancer and Gastropanel. Rom J Intern Med 2016;54:151–156. doi:10.1515/rjim-2016-0025
4. Hooi JKY, Lai WY, Ng WK, et al. Global Prevalence of Helicobacter pylori Infection: Systematic Review and Meta-analysis. Gastroenterology 2017;153:420-429. doi:10.1053/j.gastro.2017.04.022
5. Li Y, Choi H, Leung K, Jiang F, Graham DY, Leung WK. Global prevalence of Helicobacter pylori infection between 1980 and 2022: a systematic review and meta-analysis . Lancet Gastroenterol Hepatol 2023;8:553–564. doi:10.1016/S2468-1253(23)00070-5
6. Chen YC, Malfertheiner P, Yu HT, et al. Global Prevalence of Helicobacter pylori Infection and Incidence of Gastric Cancer Between 1980 and 2022. Gastroenterology 2024;166:605–619. doi:10.1053/j.gastro.2023.12.022
7. Santos MLC, De Brito BB, Da Silva FAF, et al. Helicobacter pylori infection: Beyond gastric manifestations. World J Gastroenterol 2020:4076–4093. doi:10.3748/wjg.v26.i28.4076
8. Gravina AG, Priadko K, Ciamarra P, et al. Extra-gastric manifestations of helicobacter pylori infection. J Clin Med 2020;9:3887. doi:10.3390/jcm9123887
9. Wex T, Venerito M, Kreutzer J, Götze T, Kandulski A, Malfertheiner P. Serological prevalence of helicobacter pylori infection in Saxony-Anhalt, Germany, in 2010. Clin Vaccine Immunol 2011;18:2109–2112. doi:10.1128/CVI.05308-11
10. Franck C HALASCWKBEHMVMMP. Prevalence of Helicobacter pylori infection among blood donors in Saxony-Anhalt, Germany - a region at intermediate risk for gastric cancer. Z Gastroenterol 2017;653–656. doi:10.1055/s-0043-106311
11. Michel A, Pawlita M, Boeing H, Gissmann L, Waterboer T. Helicobacter pylori antibody patterns in Germany: A cross-sectional population study. Gut Pathog 2014;6:10. doi:10.1186/1757-4749-6-10
12. GBD 2015 Mortality and Causes of Death Collaborators. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet 2016;388:1459–1544. doi:10.1016/S0140-6736(16)31012-1
13. Fischbach W, Bornschein J, Hoffmann JC, et al. Update S2k-Guideline Helicobacter pylori and gastroduodenal ulcer disease of the German Society of Gastroenterology, Digestive and Metabolic Diseases (DGVS). Z Gastroenterol 2024;62:261–321. doi:10.1055/a-2181-2225

14. Bálint L, Tiszai A, Kozák G, et al. Epidemiologic characteristics of Helicobacter pylori infection in southeast Hungary. World J Gastroenterol 2019;25:6365–6372. doi:10.3748/wjg.v25.i42.6365
15. He J, Liu Y, Ouyang Q, et al. Helicobacter pylori and unignorable extragastric diseases: Mechanism and implications. Front Microbiol 2022;13:972777. doi:10.3389/fmicb.2022.972777
16. Gravina AG, Zagari RM, De Musis C, Romano L, Loguercio C, Romano M. Helicobacter pylori and extragastric diseases: A review. World J Gastroenterol 2018;24:3204-3221. doi:10.3748/wjg.v24.i29.3204
17. Alarfaj SJ, Abdallah Mostafa S, Abdelsalam RA, et al. Helicobacter pylori Infection in Cirrhotic Patients With Portal Hypertensive Gastropathy: A New Enigma? Front Med (Lausanne) 2022:9:902255. doi:10.3389/fmed.2022.902255
18. Sathar SA, Kunnathuparambil SG, Sreesh S, Narayanan P, Vinayakumar KR. Helicobacter pylori infection in patients with liver cirrhosis: prevalence and association with portal hypertensive gastropathy Ann Gastroenterol 2014;27:48-52.
19. Pogorzelska J, Łapińska M, Kalinowska A, Lapiński TW, Flisiak R. Helicobacter pylori infection among patients with liver cirrhosis. Eur J Gastroenterol Hepatol 2017;29:1161–1165. doi:10.1097/MEG.0000000000000928
20. Okushin K, Tsutsumi T, Ikeuchi K, et al. Helicobacter pylori infection and liver diseases: Epidemiology and insights into pathogenesis. World J Gastroenterol 2018;24:3617-3625. doi:10.3748/wjg.v24.i32.3617
21. Li J, Yu H, Wang Y, et al. A meta-analysis of the association between Helicobacter pylori infection and risk of hepatic encephalopathy. J Public Health (Oxf) 2023;45:321-329. doi:10.1093/pubmed/fdac078
22. Amin S, Shrestha B, Deshmukh A, Shrestha M, Desai P, Altomare J. Helicobacter pylori Infection and Complications of Cirrhosis. Cureus 2024;16:e54419. doi:10.7759/cureus.54419
23. Abdel-Razik A, Mousa N, Elhelaly R, et al. Helicobacter pylori as an Initiating Factor of Complications in Patients With Cirrhosis: A Single-Center Observational Study. Front Med 2020;7:96. doi:10.3389/fmed.2020.00096
24. Abdel-Razeq R, Bitar L, Bitar ER, et al. Prevalence and risk factors associated with metabolic dysfunction-associated steatohepatitis in patients with Helicobacter pylori infection: A population-based study. World J Hepatol 2024;16:1169–1176. doi:10.4254/wjh.v16.i10.1169
25. Mavilia-Scranton MG, Wu GY, Dharan M. Impact of Helicobacter pylori Infection on the Pathogenesis and Management of Nonalcoholic Fatty Liver Disease. J Clin Transl Hepatol 2023;11:670–674. doi:10.14218/JCTH.2022.00362
26. Kløve S, Stinson SE, Romme FO, et al. Helicobacter pylori seropositivity associates with hyperglycemia, but not obesity, in Danish children and adolescents. BMC Med 2024;22:379. doi:10.1186/s12916-024-03591-w
27. Lee M, Baek H, Park JS, et al. Current helicobacter pylori infection is significantly associated with subclinical coronary atherosclerosis in healthy subjects: Across-sectional study. PLoS One 2018;13:e0193646. doi:10.1371/journal.pone.0193646
28. Munteanu SN, Huțanu D, Filip AM, Cozac-Szőke AR, Mocan S, Negovan A. Type 2 Diabetes Mellitus and Helicobacter pylori Gastritis in Patients Referred for Endoscopy—A Single-Center Romanian Study. Life (Basel) 2024;14:1160. doi:10.3390/life14091160