

Current Status of *Helicobacter pylori* Infection and Associated Factors among the Dong Ethnic Population in Xinhuang County

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Abstract: *Objective:* This study examined the current status of *Helicobacter pylori* (*H. pylori*) infection among the Dong population in Xinhuang Dong Autonomous County. It also identified factors associated with infection to inform targeted prevention and control strategies. *Methods:* This retrospective study enrolled outpatients and health-checkup attendees who underwent a ¹⁴C-urea breath test at Xinhuang County People's Hospital between January 2024 and January 2025. Infection status was determined by the breath test, and demographic, dietary, and lifestyle data were collected from the hospital information management system and a standardized questionnaire. Univariate χ^2 tests and multivariable logistic regression were used to assess factors associated with infection. *Results:* Among 1,052 Dong residents of Xinhuang County, the overall *H. pylori* infection rate was 34.22%. Education at high school level or below, employment outside the public institutional system, smoking, and alcohol consumption were independent risk factors. A history of chronic disease and regular consumption of black oil tea were protective factors. *Conclusion:* The *H. pylori* infection rate among the Dong population in Xinhuang County is relatively low. The mechanism behind the apparent protective effect of black oil tea remains unclear. Prospective studies of its components are warranted to clarify this effect and to expand the options for treating *H. pylori* infection.

Keywords: *Helicobacter pylori*; Prevalence; Risk factors; Dong ethnic group; Retrospective study

Online publication: Aug 31, 2026

1. Introduction

Helicobacter pylori (*H. pylori*) is a Gram-negative bacillus closely associated with chronic gastritis, peptic ulcer disease, and gastric cancer. It is among the most common chronic bacterial infections worldwide and has been classified as a Group 1 carcinogen by the World Health Organization ^[1]. In China, the reported prevalence of *H. pylori* infection among adults ranges from 40% to 60%, and the global prevalence is

approximately 50%. Infection rates differ markedly across regions and population groups ^[1,2].

Xinhuang Dong Autonomous County lies in western Hunan Province and is home to a predominantly Dong population. Its economy is relatively underdeveloped, and its sanitation facilities are limited. To date, no systematic investigation of *H. pylori* infection has been conducted among the Dong people in this region. The present study therefore analyzed the prevalence of *H. pylori* infection and its risk factors in this population. Our goal was to provide a scientific basis for targeted prevention and control strategies.

2. Study design and methods

2.1. Study design

This retrospective study enrolled individuals who underwent a ¹⁴C-urea breath test (¹⁴C-UBT) at Xinhuang County People's Hospital between January 2024 and January 2025. Participants included symptomatic outpatients and health-checkup attendees. Infection status was determined by the breath test, and demographic characteristics, dietary patterns, and lifestyle habits were collected through the hospital information management system and a standardized questionnaire.

2.2. Inclusion and exclusion criteria

The inclusion criteria were as follows:

- (1) Age 18 years or older;
- (2) Dong ethnicity;
- (3) Long-term residence in Xinhuang County.

The exclusion criteria were as follows:

- (1) Pregnancy or lactation;
- (2) Use of antibiotics, bismuth preparations, or proton pump inhibitors within the preceding 4 weeks;
- (3) Severe cardiac, hepatic, or renal insufficiency;
- (4) Refusal to participate or failure to complete the questionnaire and breath test.

2.3. Detection of *H. pylori* infection

H. pylori infection was detected with the ¹⁴C-urea breath test (¹⁴C-UBT), a rapid, noninvasive method with an accuracy exceeding 95%. A designated nurse in the endoscopy unit performed all tests. After fasting, each participant provided a baseline breath sample and then ingested a capsule containing 37 kBq of ¹⁴C-labeled urea. After sitting quietly for 15 minutes, the participant provided a second breath sample. An ionization-chamber detector measured the ionization current to estimate ¹⁴C activity, and a reading greater than 150 disintegrations per minute (DPM) was considered positive.

2.4. Survey variables

Basic information, including age, sex, and ethnicity, was obtained from the hospital information management system. A questionnaire was designed according to the lifestyle characteristics of Dong communities in Xinhuang County. It covered education level, occupation, smoking, and alcohol consumption. It also recorded histories of digestive diseases (hepatobiliary, pancreatic, gastric, and intestinal), chronic diseases (lasting more than 6 months and requiring regular medication), and Dong-specific dietary habits. These habits included consumption of sour, spicy, and pickled foods and black oil tea. Regular consumption of

these foods or of black oil tea was defined as a duration of more than 2 years.

2.5. Statistical analysis

All statistical analyses were performed using SPSS version 25.0. Categorical data are presented as counts and percentages, and between-group comparisons were made with the χ^2 test. Multivariable logistic regression was used to identify factors associated with *H. pylori* infection. A two-sided *p*-value below 0.05 was considered statistically significant.

3. Results

3.1. Participant characteristics

A total of 1,052 Dong residents of Xinhuang County were included, comprising 485 men (46.10%) and 567 women (53.90%). Of these, 360 tested positive and 692 tested negative for *H. pylori*, yielding an overall infection rate of 34.22%.

3.2. Univariate analysis of factors associated with *H. pylori* infection

In univariate analysis, education at high school level or below, employment outside the public institutional system, smoking, and alcohol consumption were associated with *H. pylori* infection (all *p* < 0.05). Absence of chronic disease and no regular consumption of black oil tea were also associated with infection (both *p* < 0.05). Sex, age, history of digestive disease, and consumption of sour, spicy, and pickled foods showed no significant association (all *p* > 0.05) (Table 1).

Table 1. Univariate analysis of factors associated with *H. pylori* infection

Factor	Category	<i>H. pylori</i> positive, n	<i>H. pylori</i> negative, n	Infection rate, %	χ^2	<i>p</i>
Sex	Male	166	319	34.23	0.000	0.997
	Female	194	373	34.22		
Age	< 60 years	167	322	34.15	0.002	0.965
	≥ 60 years	193	370	34.28		
Education level	High school or below	279	458	37.86	14.453	< 0.001
	University	81	234	25.71		
Occupation	Within public institutional system	59	412	12.53	178.305	< 0.001
	Outside public institutional system	301	280	51.81		
Smoking	Yes	75	95	43.60	8.044	0.005
	No	285	597	32.39		
Alcohol consumption	Yes	82	105	43.85	9.369	0.002
	No	278	587	32.14		
History of digestive disease	Yes	54	72	42.86	0.930	0.335
	No	306	620	33.05		
History of chronic disease	Yes	113	283	28.54	9.118	0.003
	No	247	409	37.65		

Sour, spicy, and pickled foods	Yes	38	94	28.79	1.979	0.159
	No	322	598	35.00		
Black oil tea consumption	Yes	191	668	22.24	298.798	< 0.001
	No	169	24	87.56		

3.3. Multivariable logistic regression analysis of factors associated with *H. pylori* infection

Factors that were statistically significant in the univariate analysis were entered into a multivariable logistic regression model. *H. pylori* infection status served as the dependent variable (negative = 0; positive = 1). Education at high school level or below, employment outside the public institutional system, smoking, and alcohol consumption were independent risk factors. A history of chronic disease and regular consumption of black oil tea were protective factors. All associations were statistically significant ($p < 0.05$) (Table 2).

Table 2. Multivariable analysis of factors associated with *H. pylori* infection

Factor	β	p	OR (95% CI)
Education level	0.739	0.008	2.094 (1.209–3.624)
Occupation	2.613	< 0.001	13.637 (7.812–23.804)
Smoking	0.700	0.009	2.015 (1.189–3.415)
Alcohol consumption	0.894	< 0.001	2.446 (1.527–3.917)
History of chronic disease	−0.393	0.045	0.675 (0.460–0.991)
Black oil tea consumption	−5.063	< 0.001	0.006 (0.002–0.018)

4. Discussion

The overall *H. pylori* infection rate among the Dong population in Xinhuang County was 34.22%, lower than the 40% to 60% reported among adults in China ^[1]. This difference may reflect regional variation or the timing of the survey, and it could also stem from selection bias, because a considerable proportion of participants were health-checkup attendees.

Education at high school level or below, employment outside the public institutional system, smoking, and alcohol consumption were identified as risk factors for *H. pylori* infection. These findings are consistent with previous reports ^[3,4]. People with less education or with jobs outside the public institutional system may have lower health literacy. They may also have limited exposure to *H. pylori*-related health education and preventive measures, which could raise their risk of infection. Smoking and alcohol consumption may directly damage the gastric mucosal barrier and increase the risk of *H. pylori* colonization ^[5]. These habits are also associated with more social gatherings and shared meals, which can facilitate transmission of the bacterium.

A history of chronic disease and regular consumption of black oil tea emerged as protective factors. One possible explanation is that people with chronic disease pay closer attention to their health ^[6]. They may quit smoking, limit alcohol intake, and eat out less frequently, which can reduce opportunities for *H. pylori* transmission. Black oil tea is a dietary tradition unique to the Dong community and holds an important place in Dong culinary culture ^[7]. Its protective mechanism against *H. pylori* remains unclear, but anti-inflammatory or antibacterial components may be involved ^[8]. Such components could partly account for the relatively low infection rate observed in this population. Prospective studies are therefore recommended to

identify the active components of black oil tea and to clarify how it confers protection. The ultimate goal is to provide additional and more reliable options for treating *H. pylori* infection.

In summary, the *H. pylori* infection rate among the Dong population in Xinhuang County was relatively low. Even so, public health education in ethnic minority regions should be strengthened so that residents understand how the bacterium spreads and how infection can be prevented. Personal hygiene deserves particular attention, especially avoiding the shared use of toothbrushes, eating utensils, and other objects that might carry the bacteria. Educational programs should also be adapted to the cultural background of the Dong community, using the local language and traditional practices to improve acceptance. Lifestyle changes are equally important. Reducing exposure to risk factors such as smoking and alcohol consumption and encouraging healthier routines could help lower infection risk. As for the observed link between black oil tea and *H. pylori* infection, the underlying mechanism remains unclear and warrants further investigation.

5. Limitations and future directions

This single-center, cross-sectional study limits the strength of the evidence, and information collected through the questionnaire may have been subject to recall bias. Future studies should adopt multicenter prospective cohort designs to examine causal relationships between *H. pylori* infection and potential risk and protective factors. Particular attention should be given to the protective mechanism of black oil tea, which may offer additional possibilities for prevention and treatment.

Disclosure statement

The authors declare no conflict of interest.

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