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ABOUT COVER

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AIMS AND SCOPE

The primary aim of *World Journal of Gastrointestinal Oncology* (*WJGO*, *World J Gastrointest Oncol*) is to provide scholars and readers from various fields of gastrointestinal oncology with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

   WJGO mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal oncology and covering a wide range of topics including liver cell adenoma, gastric neoplasms, appendiceal neoplasms, biliary tract neoplasms, hepatocellular carcinoma, pancreatic carcinoma, cecal neoplasms, colonic neoplasms, colorectal neoplasms, duodenal neoplasms, esophageal neoplasms, gallbladder neoplasms, *etc*.

INDEXING/ABSTRACTING

The *WJGO* is now abstracted and indexed in PubMed, PubMed Central, Science Citation Index Expanded (SCIE, also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2022 edition of Journal Citation Reports® cites the 2021 impact factor (IF) for *WJGO* as 3.404; IF without journal self cites: 3.357; 5-year IF: 3.250; Journal Citation Indicator: 0.53; Ranking: 162 among 245 journals in oncology; Quartile category: Q3; Ranking: 59 among 93 journals in gastroenterology and hepatology; and Quartile category: Q3. The *WJGO*'s CiteScore for 2021 is 3.6 and Scopus CiteScore rank 2021: Gastroenterology is 72/149; Oncology is 203/360.

RESPONSIBLE EDITORS FOR THIS ISSUE

ORIGINAL ARTICLE

Case Control Study

Inverse relations between *Helicobacter pylori* infection and risk of esophageal precancerous lesions in drinkers and peanut consumption

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Abstract

BACKGROUND

Helicobacter pylori (*H. pylori*) is a Gram-negative bacterium found in the upper digestive tract. Although *H. pylori* infection is an identified risk factor for gastric cancer, its role in esophageal squamous cell carcinoma (ESCC) remains a topic of much debate.

AIM

To evaluate the association between *H. pylori* infection and the risk of precancerous lesions of ESCC, and further explore the association between dietary factors and the risk of *H. pylori* infection.

METHODS

Two hundred patients with esophageal precancerous lesions (EPL) aged 63.01 ± 6.08 years and 200 healthy controls aged 62.85 ± 6.03 years were included in this case-control study. Epidemiological data and qualitative food frequency data were investigated. Enzyme-linked immunosorbent assay measuring serum immunoglobulin G antibodies was used to determine *H. pylori* seropositivity. An unconditional logistic regression model was used to assess the association between *H. pylori* infection and EPL risk dichotomized by gender, age, and the use of tobacco and alcohol, as well as the association between dietary factors and the

risk of *H. pylori* infection.

RESULTS
A total of 47 (23.5%) EPL cases and 58 (29.0%) healthy controls had positive *H. pylori* infection. An inverse relation between *H. pylori* infection and the risk of EPL was found in the group of drinkers after adjustment for covariates [odds ratio (OR) = 0.32, 95% confidence interval (95%CI): 0.11-0.95]. Additionally, peanut intake was significantly associated with a decreased risk of *H. pylori* infection (OR = 0.39, 95%CI: 0.20-0.74).

CONCLUSION
Our study suggested that *H. pylori* infection may decrease the risk of EPL for drinkers in a rural adult Chinese population, and the consumption of peanut may reduce the risk of *H. pylori* infection. These findings should be framed as preliminary evidence, and further studies are required to address whether the mechanisms are related to the localization of lesions and alcohol consumption.

Key Words: *Helicobacter pylori*; Esophageal precancerous lesions; Peanut consumption; Esophageal squamous cell carcinoma

Core Tip: The association between *Helicobacter pylori* (*H. pylori*) infection and esophageal squamous cell carcinoma (ESCC) remains a topic of much debate. This study aimed to evaluate the association between *H. pylori* infection and the risk of precancerous lesions of ESCC, and further explore the association between dietary intake and the risk of *H. pylori* infection. Our findings suggested an inverse association between *H. pylori* infection and the risk of esophageal precancerous lesions in the group of drinkers [odds ratio (OR) = 0.32, 95% confidence interval (95%CI): 0.11-0.95]. Additionally, peanut consumption was significantly associated with a reduced risk of *H. pylori* infection (OR = 0.39, 95%CI: 0.20-0.74).

INTRODUCTION

Esophageal cancer and gastric cancer are upper gastrointestinal cancers that share many risk factors[1-3]. However, their associations with *Helicobacter pylori* (*H. pylori*) infection can be completely different. It has been determined that *H. pylori* infection is an identified risk factor for gastric cancer[4], whereas the role of *H. pylori* in the risk of esophageal cancer remains controversial. Previous meta-analyses summarized that *H. pylori* infection is likely to be related to a reduced risk of esophageal adenocarcinoma (EAC)[5-9]. One of the reliable assumptions related to this phenomenon is that *H. pylori* infection causes gastric atrophy and parietal cell loss, thus leading to alleviated reflux and consequently, a decreased incidence of reflux esophagitis and Barrett's esophagus (precursor for EAC)[10-12]. However, the impact of *H. pylori* infection on esophageal squamous cell carcinoma (ESCC) is not well understood, and research is inconclusive as to what population may be significantly influenced[9,13-15]. Previous meta-analyses also reported that in the general population, no significant association was found between *H. pylori* infection and ESCC risk[6-8], whereas an inverse association was observed in the Middle East[9]. In the other populations, the inverse relationship was found to be highly associated with age, smoking status, and drinking status[15].

H. pylori is a Gram-negative bacterium found in the upper digestive tract. In spite of the fact that *H. pylori* infection may reduce the risk of EAC, it may also cause an adverse effect on human health. Apart from the elevated risk of gastric cancer, *H. pylori* infection is also etiologically related to peptic ulcers, atrophic and non-atrophic gastritis, and lymphoma associated with gastric mucosa, and is able to induce reduced bioavailability and malabsorption of nutrients including iron and vitamin B_{12}[16-18]. This case-control study aimed to investigate the association between *H. pylori* infection and the risk of precancerous lesions of ESCC, which is an identified early stage of carcinogenesis, and further examine the association between dietary factors and the risk of *H. pylori* infection.

MATERIALS AND METHODS

This study was carried out in a high-incidence area for ESCC located in Huai'an District, Huai'an City, Jiangsu Province, China, where the crude incidence rate from 1998 to 2016 was 91.85/100000[19]. As described in our previous studies[20-22], the Early Diagnosis and Early Treatment Project of Esophageal Cancer (EDETPEC) supported by the government and Cancer Foundation of China has been carried out in the endemic regions including Huai'an District since 2010. Local residents were required to undergo routine endoscopies. A detailed introduction to esophageal precancerous lesions (EPL) based on histological criteria for dysplasia and methods for EPL diagnosis has already been given in a previous study[21]. The localization of EPL was based on the definition of upper thoracic esophagus (from thoracic inlet to level of tracheal bifurcation; 18-23 cm from incisors), mid thoracic esophagus (from tracheal bifurcation midway to gastroesophageal junction; 24-32 cm from incisors), and lower thoracic esophagus (from midway between tracheal bifurcation and gastroesophageal junction to gastroesophageal junction, including abdominal esophagus; 32-40 cm from incisors)[23]. Figure 1 shows the flowchart of the study population and data collection process. This study included 200 EPL cases aged 62.85 ± 6.03 years and 200 healthy controls aged 63.01 ± 6.08 years matched by gender, age (± 2 years), and villages. The collection of epidemiological data and dietary intake data based on questionnaire method has been introduced in detail previously[21]. Subjects were required to provide the amount of beer/wine/liquor/any other alcoholic drinks consumed per day, which meant that the average alcohol units consumed per day could be estimated. Separated serum samples were obtained by centrifuging collected fasting blood samples at 3000 rpm for 5 min. Enzyme-linked immunosorbent assay (ELISA, KingMed Diagnostics Group Co., Ltd. Guangzhou, China) measuring serum immunoglobulin G (IgG) antibodies was used to determine *H. pylori* seropositivity. Sensitivity of the ELISA test was 97.9% [95% confidence interval (95%CI): 88.9%-99.9%] and specificity was 100% (95%CI: 86.8%-100%).

Epidata version 3.1 (EpiData Association, Odense, Denmark) was used for inputting and validating the epidemiological data and dietary intake data. Then, SPSS version 22.0 (SPSS, Chicago, IL, United States) was used to establish a database and perform statistical analyses. Two independent samples *t*-test and conditional logistic regression model were used to evaluate the differences in general characteristics and potential factors between healthy controls and EPL cases, wherever appropriate. The Fisher's exact test was used to analyze the difference in localization of EPL and *H. pylori* infection. An unconditional logistic regression model was used to assess the association between *H. pylori* infection and EPL risk dichotomized by gender, age, and tobacco and alcohol use, as well as the association between dietary factors and *H. pylori* infection. Covariates including gender, age, body mass index (BMI), education level, annual income, number of cigarettes per day, and alcohol units consumed per day were adjusted in the logistic regression model. Meanwhile, odds ratio (OR) and 95%CI were calculated accordingly. Statistical significance was defined as $P < 0.05$ (two-tailed).

The study protocol was approved by the Institutional Review Board of Southeast University Zhongda Hospital (Approval No. 2016ZDKYSB017), and the written informed consent was obtained.

RESULTS

Two hundred EPL cases aged 63.01 ± 6.08 years and 200 healthy controls aged 62.85 ± 6.03 years were enrolled. Among the pairs, 100 were males and 100 were females. Table 1 shows that 47 (23.5%) and 58 (29.0%) out of 200 cases and 200 controls, respectively, had *H. pylori* infection. Two independent samples *t*-test and conditional logistic regression analysis indicated that there were no statistically significant differences in age, BMI, education level, annual income per person, current drinking status, or *H. pylori* infection between the two groups after adjustment for covariates ($P > 0.05$). Compared with non-smokers, a smoking habit of more than 20 cigarettes a day was significantly associated with an elevated risk of EPL ($P < 0.05$).

Based on routine endoscopy examination, the study found that the number of cases whose EPL developed in upper, mid, and lower thoracic esophagus was 3, 130, and 67, respectively. Table 2 shows that the control group had the highest positive rate of *H. pylori* infection (29.0%), followed by EPL cases of upper and mid thoracic esophagus (24.8%) and EPL cases of lower thoracic esophagus (20.9%), but there was no statistically significant differences.

As shown in Table 3, when subjects were dichotomized according to gender, age, and the use of tobacco and alcohol, the protective effect of *H. pylori* infection against the risk of EPL was found in the group of drinkers after adjustment for covariates (OR = 0.32, 95%CI: 0.11-0.95). Supplementary Tables 1 and 2 shows that there may be a nonsignificant decreasing trend of *H. pylori* infection rate when alcohol consumption is increasing.

Figure 2 illustrates the association between dietary factors and the risk of *H. pylori* infection after the adjustment for covariates *via* the unconditional logistic regression model. The result indicated that peanut intake was significantly associated with a reduced risk of *H. pylori* infection (OR = 0.39, 95%CI 0.20-0.74). Supplementary Table 3 shows that there may be a significant positive association between peanut consumption and alcohol drinking (*P* for trend < 0.05).

Table 1 Characteristics and potential factors in cases with esophageal precancerous lesions and controls

Category	Cases, *n* = 200	Controls, *n* = 200	Adjusted OR (95%CI)[1]	*P* value
Age (yr), mean ± SD	63.01 ± 6.08	62.85 ± 6.03		0.792[a]
BMI (kg/m^2), mean ± SD	24.52 ± 3.33	24.36 ± 3.37		0.631[a]
Normal (18.5-23.9)	82 (41.0%)	84 (42.0%)	1.00 (reference)	
Underweight (< 18.5)	4 (2.0%)	5 (2.5%)	0.61 (0.12-3.02)	0.545
Overweight (24.0-28.0)	84 (42.0%)	89 (44.5%)	0.95 (0.61-1.49)	0.836
Obese (> 28.0)	30 (15.0%)	22 (11.0%)	1.61 (0.83-3.12)	0.164
Education level				
Illiterate	100 (50.0%)	96 (48.0%)	1.00 (reference)	
Primary school education	74 (37.0%)	77 (38.5%)	0.79 (0.45-1.39)	0.413
Middle school education and higher	26 (13.0%)	27 (13.5%)	0.81 (0.36-1.79)	0.599
Annual income/person (RMB)				
1-5000	53 (26.5%)	42 (21.0%)	1.00 (reference)	
5001-10000	88 (44.0%)	86 (43.0%)	0.75 (0.45-1.25)	0.267
> 10000	59 (29.5%)	72 (36.0%)	0.67 (0.37-1.21)	0.183
Current smoking status (number of cigarettes/d)				
Non-smoker	126 (63.0%)	134 (67.0%)	1.00 (reference)	
1-10	20 (10.0%)	17 (8.5%)	1.39 (0.67-2.87)	0.381
11-20	38 (19.0%)	41 (20.5%)	1.10 (0.61-1.97)	0.755
> 20	16 (8.0%)	8 (4.0%)	3.11 (1.00-9.63)	0.049
Current drinking status (alcohol units consumed/d, 1 unit is 8 g or 10 mL of pure alcohol)				
Non-drinker	147 (73.5%)	151 (75.5%)	1.00 (reference)	
< 4	10 (5.0%)	10 (5.0%)	1.03 (0.41-2.59)	0.954
4-	26 (13.0%)	23 (11.5%)	1.02 (0.52-2.02)	0.946
8-	17 (8.5%)	16 (8.0%)	1.06 (0.47-2.42)	0.885
H. pylori infection				
Negative	153 (76.5%)	142 (71.0%)	1.00 (reference)	
Positive	47 (23.5%)	58 (29.0%)	0.75 (0.46-1.24)	0.265

[a]*P* value of two independent samples *t*-test.

[1]Conditional logistic regression model with adjustment for gender, age, BMI, education level, annual income, number of cigarettes per day, and alcohol units consumed per day, except the specific variable itself.

H. pylori: *Helicobacter pylori*; BMI: Body mass index; OR: Odds ratio.

DISCUSSION

This study revealed that in drinkers, there was an association between *H. pylori* infection and a reduced risk of EPL, which is an identified early stage of esophageal carcinogenesis. However, the relationship between *H. pylori* infection and ESCC is still subject to much discussion. Some researchers believed that infection with *H. pylori* can increase the risk of ESCC by causing gastric atrophy that promotes excessive bacterial growth and causes endogenous nitrosamine production[24-26]. However, other studies which held that *H. pylori* infection probably plays a protective role in ESCC postulated that the protection is mediated *via* gastric atrophy, whereas the mechanism is related to a reduced load of esophageal acid[27, 28]. Therefore, it is likely that ESCC might be affected in a double-edged manner by *H. pylori* infection, which is dependent on population and other possible external factors. For example, previous studies have indicated that acid regurgitation may be facilitated by the reduction in lower esophageal sphincter's pressure and the retard of both esophageal motility and gastric emptying due to large consumption of alcoholic beverages[29-33]. Therefore, the current hypothesis is that *H. pylori* infection just alleviates esophageal reflux caused by alcohol to some extent, thus reducing the risk of esophageal

Table 2 Difference in *Helicobacter pylori* infection among controls and cases with esophageal precancerous lesions

Group	H. pylori infection			P value[a]
	Negative	**Positive**	**Positive rate**	
Controls	142	58	29.0%	
EPL cases (upper and mid thoracic esophagus)	100	33	24.8%	0.384
EPL cases (lower thoracic esophagus)	53	14	20.9%	

[a]*P* value of Fisher's exact test.

H. pylori: Helicobacter pylori.

Table 3 Association between *Helicobacter pylori* infection and esophageal precancerous lesion risk dichotomized by gender, age, cigarette smoking, and alcohol drinking

	Cases	Controls	Crude OR (95%CI)	P value	Adjusted OR (95%CI)[1]	P value
Male	*n* = 100	*n* = 100				
H. pylori (-)	78 (78.0%)	72 (72.0%)	1.00 (reference)	-	1.00 (reference)	-
H. pylori (+)	22 (22.0%)	28 (28.0%)	0.73 (0.38-2.38)	0.328	0.64 (0.32-1.27)	0.200
Female	*n* = 100	*n* = 100				
H. pylori (-)	75 (75.0%)	70 (70.0%)	1.00 (reference)	-	1.00 (reference)	-
H. pylori (+)	25 (25.0%)	30 (30.0%)	0.78 (0.42-1.45)	0.429	0.82 (0.42-1.58)	0.548
Age < 65 years	*n* = 107	*n* = 107				
H. pylori (-)	76 (71.0%)	73 (68.2%)	1.00 (reference)	-	1.00 (reference)	-
H. pylori (+)	31 (29.0%)	34 (31.8%)	0.88 (0.49-1.57)	0.656	0.89 (0.47-1.67)	0.708
Age ≥ 65 years	*n* = 93	*n* = 93				
H. pylori (-)	77 (82.8%)	69 (74.2%)	1.00 (reference)	-	1.00 (reference)	-
H. pylori (+)	16 (17.2%)	24 (25.8%)	0.60 (0.29-1.22)	0.156	0.59 (0.27-1.28)	0.183
Cigarette smoking (-)	*n* = 126	*n* = 134				
H. pylori (-)	97 (77.0%)	93 (69.4%)	1.00 (reference)	-	1.00 (reference)	-
H. pylori (+)	29 (23.0%)	41 (30.6%)	0.68 (0.39-1.18)	0.170	0.74 (0.42-1.32)	0.310
Cigarette smoking (+)	*n* = 74	*n* = 66				
H. pylori (-)	56 (75.7%)	49 (74.2%)	1.00 (reference)	-	1.00 (reference)	-
H. pylori (+)	18 (24.3%)	17 (25.8%)	0.93 (0.43-1.99)	0.845	0.80 (0.34-1.86)	0.601
Alcohol drinking (-)	*n* = 147	*n* = 151				
H. pylori (-)	109 (74.1%)	109 (72.2%)	1.00 (reference)	-	1.00 (reference)	-
H. pylori (+)	38 (25.9%)	42 (27.8%)	0.91 (0.54-1.51)	0.702	0.94 (0.55-1.61)	0.831
Alcohol drinking (+)	*n* = 53	*n* = 49				
H. pylori (-)	44 (83.0%)	33 (67.3%)	1.00 (reference)	-	1.00 (reference)	-
H. pylori (+)	9 (17.0%)	16 (32.7%)	0.42 (0.17-1.07)	0.070	0.32 (0.11-0.95)	0.040

[1]Adjustment for gender, age, BMI, education level, annual income, number of cigarettes per day, and alcohol units consumed per day.

H. pylori: Helicobacter pylori; 95%CI: 95% confidence interval; OR: Odds ratio.

carcinogenesis caused by acid reflux. Our results also reported that EPL cases of lower thoracic esophagus had the lowest positive rate of *H. pylori* infection, which may support the hypotheses to some extent, although the difference was not statistically significant. In addition, there is more data indicating the positive role of this bacterium for humans. For example, a recent review considered the data on *H. pylori* and suggested that *H. pylori* may be a latent or opportunistic pathogen rather than a true pathogen
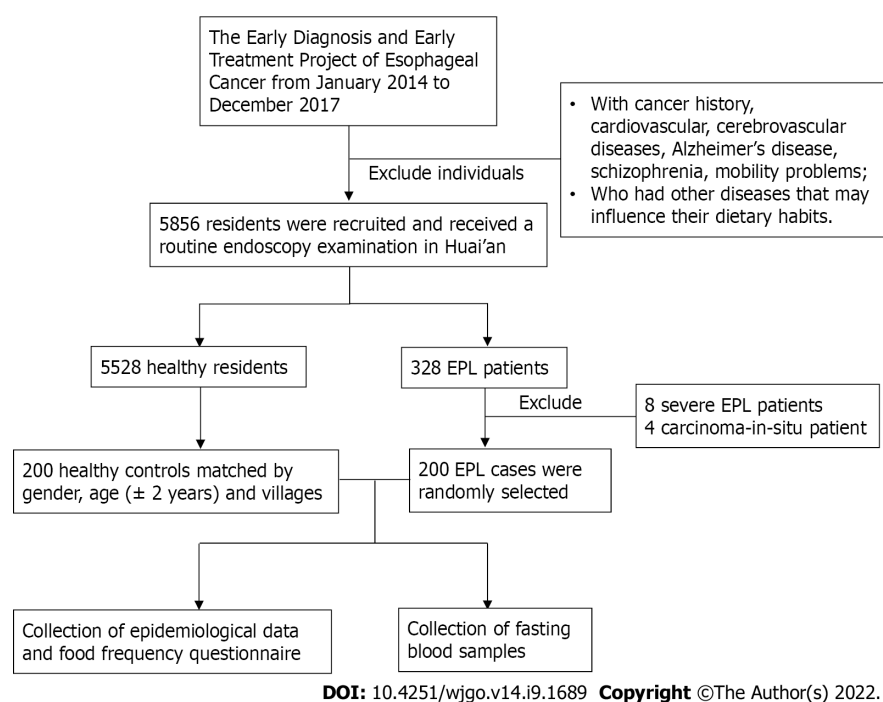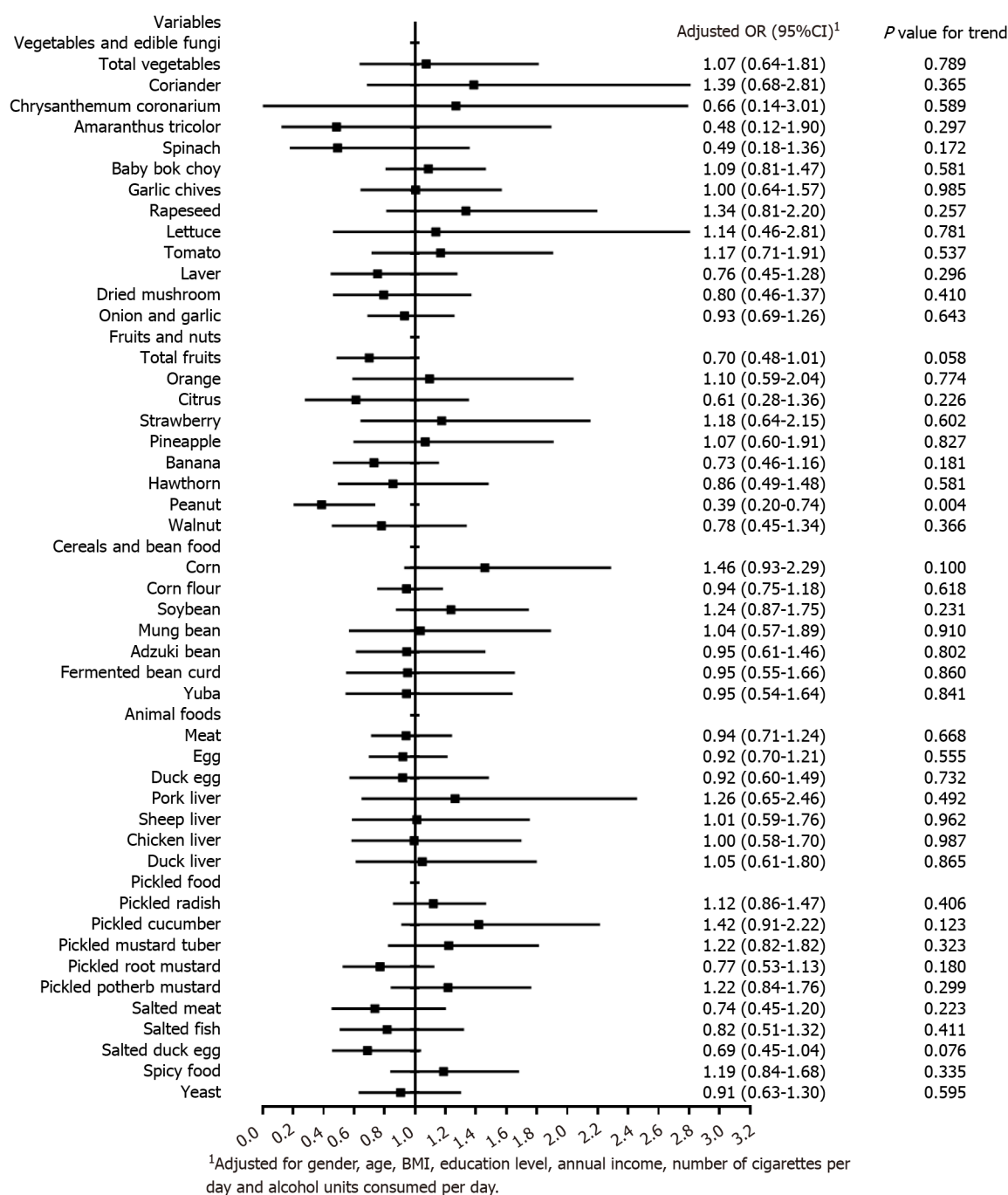
Figure 1 Flowchart of study population and sample collection.

of some diseases, and is possibly part of the normal human microbiome as a commensal or even a symbiont organism[34]. However, it was reported that a regular but moderate alcohol intake could possibly facilitate elimination of *H. pylori* infection[35]. Supplementary material also shows a nonsignificant decreasing trend of *H. pylori* infection rate when alcohol consumption is increasing. This partly supports the hypothesis that there is a possibility that drinkers without *H. pylori* infection could have more alcohol consumption. In other words, the decreased EPL risk in drinkers with *H. pylori* infection is possibly related to a lower alcohol consumption. However, because the result was not statistically significant, and there was no significant association between alcohol consumption and EPL risk in Huai'an in both this study and the previous epidemiological investigation[21], it is hard to address whether the reduced risk of EPL in drinkers with *H. pylori* infection was related to a reduced alcohol intake.

Additionally, the present study reported that the consumption of peanuts may provide protection from *H. pylori* infection. Since peanuts are high in fat, the duodenal mucosa secretes the hormone enterogastrone when fatty food is present in the stomach or small intestine[36]. Enterogastrone inhibits gastric movements and secretion of gastric acid, possibly by blocking the production or activity of gastrin, the hormone that initially leads to these functions[37]. Therefore, the reduced amount of acid produced may influence the growth of *H. pylori*, as *H. pylori* is dependent on acidity to survive for a long time[38]. In addition, in China, people are likely to drink and eat peanuts at the same time, and Supplementary material shows that there was a positive association between peanut consumption and alcohol drinking. Therefore, the inverse association between the consumption of peanut and the risk of *H. pylori* infection may be mediated by alcohol drinking. However, there is still a lack of evidence to verify the above hypotheses, thus further researches are required to evaluate the relationship between peanut consumption and *H. pylori* infection.

At present, about 50% of the global population and more than 70% of the population in some developing countries are infected by *H. pylori*[39]. However, this study reported that the positive rates of *H. pylori* infection were only 23.5% and 29.0% in EPL cases and healthy controls. In an early study conducted by Gao *et al*[40], Huai'an, Jiangsu Province was selected as a high incidence area of upper digestive tract cancers, and Pizhou, Jiangsu Province was selected as a low incidence area. They used ELISA and latex agglutinate test for the detection of *H. pylori* infection, and found that the prevalence of *H. pylori* infection among the gastric cancer group/upper digestive tract cancer group in the low incidence area of Pizhou (66.67%/63.46%) was significantly higher than that in the high incidence area of Huai'an (38.64%/39.33%). However, in the high incidence area of Huai'an, the prevalence of *H. pylori* infection in non-cancer controls and the healthy family members of the cancer cases was higher than that of cases. Therefore, the previous study and our study found that the prevalence of *H. pylori* infection in Huai'an may be much lower than that in other areas, and the prevalence in upper digestive tract cancers or EPL cases can be lower than that in non-cancer population in this region.

Variables	Adjusted OR (95%CI)[1]	P value for trend
Vegetables and edible fungi		
Total vegetables	1.07 (0.64-1.81)	0.789
Coriander	1.39 (0.68-2.81)	0.365
Chrysanthemum coronarium	0.66 (0.14-3.01)	0.589
Amaranthus tricolor	0.48 (0.12-1.90)	0.297
Spinach	0.49 (0.18-1.36)	0.172
Baby bok choy	1.09 (0.81-1.47)	0.581
Garlic chives	1.00 (0.64-1.57)	0.985
Rapeseed	1.34 (0.81-2.20)	0.257
Lettuce	1.14 (0.46-2.81)	0.781
Tomato	1.17 (0.71-1.91)	0.537
Laver	0.76 (0.45-1.28)	0.296
Dried mushroom	0.80 (0.46-1.37)	0.410
Onion and garlic	0.93 (0.69-1.26)	0.643
Fruits and nuts		
Total fruits	0.70 (0.48-1.01)	0.058
Orange	1.10 (0.59-2.04)	0.774
Citrus	0.61 (0.28-1.36)	0.226
Strawberry	1.18 (0.64-2.15)	0.602
Pineapple	1.07 (0.60-1.91)	0.827
Banana	0.73 (0.46-1.16)	0.181
Hawthorn	0.86 (0.49-1.48)	0.581
Peanut	0.39 (0.20-0.74)	0.004
Walnut	0.78 (0.45-1.34)	0.366
Cereals and bean food		
Corn	1.46 (0.93-2.29)	0.100
Corn flour	0.94 (0.75-1.18)	0.618
Soybean	1.24 (0.87-1.75)	0.231
Mung bean	1.04 (0.57-1.89)	0.910
Adzuki bean	0.95 (0.61-1.46)	0.802
Fermented bean curd	0.95 (0.55-1.66)	0.860
Yuba	0.95 (0.54-1.64)	0.841
Animal foods		
Meat	0.94 (0.71-1.24)	0.668
Egg	0.92 (0.70-1.21)	0.555
Duck egg	0.92 (0.60-1.49)	0.732
Pork liver	1.26 (0.65-2.46)	0.492
Sheep liver	1.01 (0.59-1.76)	0.962
Chicken liver	1.00 (0.58-1.70)	0.987
Duck liver	1.05 (0.61-1.80)	0.865
Pickled food		
Pickled radish	1.12 (0.86-1.47)	0.406
Pickled cucumber	1.42 (0.91-2.22)	0.123
Pickled mustard tuber	1.22 (0.82-1.82)	0.323
Pickled root mustard	0.77 (0.53-1.13)	0.180
Pickled potherb mustard	1.22 (0.84-1.76)	0.299
Salted meat	0.74 (0.45-1.20)	0.223
Salted fish	0.82 (0.51-1.32)	0.411
Salted duck egg	0.69 (0.45-1.04)	0.076
Spicy food	1.19 (0.84-1.68)	0.335
Yeast	0.91 (0.63-1.30)	0.595

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2

[1]Adjusted for gender, age, BMI, education level, annual income, number of cigarettes per day and alcohol units consumed per day.

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Figure 2 Association between dietary intake and the risk of *Helicobacter pylori* infection after adjustment for covariates *via* unconditional logistic regression model. BMI: Body mass index; OR: Odds ratio.

CONCLUSION

In summary, our study suggested that *H. pylori* infection is likely to decrease EPL risk in drinkers for a rural adult Chinese population, and the consumption of peanuts may be related to a reduced risk of *H. pylori* infection. However, the sample size used is a limitation of the study, which may bring difficulties to evaluate statistical significance in some statistical analyses, thus the findings should be framed as preliminary evidence. A case-control study might be difficult to determine causality, so the statement of "protective role" might be overestimated. Hence, it is necessary to design a large-scale prospective cohort study to address the impact of *H. pylori* infection on ESCC, the localization of lesions, and the association with dietary intake and the use of alcohol in the future. Additionally, the low prevalence of *H. pylori* infection in Huai'an is a peculiar finding, which implies that further investigations are recommended.

ARTICLE HIGHLIGHTS

Research background

The role of *Helicobacter pylori* (*H. pylori*) infection in esophageal squamous cell carcinoma (ESCC) remains a topic of much debate.

Research motivation

To assess the relationship between *H. pylori* infection and the risk of precancerous lesions of ESCC, which is an identified early stage of carcinogenesis.

Research objectives

This study aimed to evaluate the association between *H. pylori* infection and the risk of esophageal precancerous lesions (EPL) in a high-incidence area in Huai'an, and further explore the association between dietary factors and the risk of *H. pylori* infection.

Research methods

The study was based on a case-control design. Epidemiological data were collected and *H. pylori* seropositivity was tested. An unconditional logistic regression model was used to analyze the association between *H. pylori* infection and EPL risk with adjustment for confounders, as well as the association between dietary factors and risk of *H. pylori* infection.

Research results

The control group had the highest positive rate of *H. pylori* infection (29.0%), followed by EPL cases of upper and mid thoracic esophagus (24.8%) and EPL cases of lower thoracic esophagus (20.9%). The protective effect of *H. pylori* infection against the risk of EPL was observed in the group of drinkers after adjustment for covariates [odds ratio (OR) = 0.32, 95% confidence interval (95%CI): 0.11-0.95]. Peanut intake was significantly associated with a reduced risk of *H. pylori* infection (OR = 0.39, 95%CI: 0.20-0.74).

Research conclusions

H. pylori infection may decrease the risk of EPL in drinkers for a rural adult Chinese population, and the consumption of peanuts may be related to a reduced risk of *H. pylori* infection.

Research perspectives

A well-designed prospective cohort study is required to address the impact of *H. pylori* infection on ESCC, the localization of lesions, and the association with dietary intake and alcohol drinking. Additionally, the low prevalence of *H. pylori* infection in Huai'an is a peculiar finding, which implies that further investigations are recommended.

Data sharing statement: All data generated or analyzed during this study are included. The technical appendix and statistical procedure are available from the corresponding author.

STROBE statement: The authors have read the STROBE Statement—checklist of items, and the manuscript was prepared and revised according to the STROBE Statement—checklist of items.

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