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ORIGINAL ARTICLE

Socioeconomic status, personal habits, and prevalence of *Helicobacter pylori* infection in the inhabitants of Lanyu

Huan-Lin Chen [a,b,c], Ming-Jen Chen [c,d,e], Shou-Chuan Shih [c,d,e], Horng-Yuan Wang [c,d,e], I-Tsung Lin [a,b,c], Ming-Jong Bair [a,b,c,*]

[a] *Division of Gastroenterology, Department of Internal Medicine, Mackay Memorial Hospital, Taitung Branch, Taitung, Taiwan*
[b] *Department of Nursing, Mackay Junior College of Medicine, Nursing, and Management, Taipei, Taiwan*
[c] *Department of Nursing, Meiho University, Pingtung, Taiwan*
[d] *Division of Gastroenterology, Department of Internal Medicine, Mackay Memorial Hospital, Taipei, Taiwan*
[e] *Department of Medicine, Mackay Medical College, New Taipei, Taiwan*

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Background/Purpose: Lanyu Island is a closed environment inhabited by the Yami people, Taiwan's smallest and most primitive tribe. This study assessed the prevalence and risk factors of *Helicobacter pylori* infection among Lanyu Island residents.
Methods: A cross-sectional study was conducted among the inhabitants of Lanyu Island, using the ^{13}C urea breath test to determine the prevalence of *H. pylori*. All study participants completed a form requesting demographic data and anthropometric measurements and a questionnaire evaluating socioeconomic characteristics and personal habits. Multiple logistic regression analyses were used to identify independent factors of *H. pylori* infections, and a two-sided $p < 0.05$ was considered significant.
Results: Among 796 participants, the mean age was 45 ± 13.2 years, with a range of 12–89 years. The overall prevalence of *H. pylori* infection was 72.1%, and there was no significant difference between genders. The *H. pylori*-infected group contained higher proportions of Yami people, married individuals, as well as higher rates of alcohol consumption and betel chewing, but lower family incomes and education levels. Multiple logistic models found that Yami ethnicity [odds ratio (OR) = 2.567, 95% confidence interval (CI): 1.344–4.905],

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* Corresponding author. Department of Internal Medicine, Mackay Memorial Hospital, Taitung Branch, 1 Lane 303, Changsha Street, Taitung 95054, Taiwan.
E-mail address: a5963@ttms.mmh.org.tw (M.-J. Bair).

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alcohol consumption (OR = 1.641, 95% CI: 1.151–2.341), and marital status (OR = 1.779, 95% CI: 1.043–3.032] were associated with *H. pylori* infection.
Conclusion: This cross-sectional study identified a high prevalence of *H. pylori* infection on Lanyu Island. When investigating *H. pylori* infection status in a closed environment, such as Lanyu Island, it is important to consider all factors relating to the host population, including environment and lifestyle.

Introduction

Health professionals have recently become increasingly concerned about the continued neglect of aboriginal communities, a factor that has led to worldwide disparities in health between aboriginal and nonaboriginal populations.[1] Accidental injuries, alcoholism, and various infections are the most important contributors to disease in aboriginal populations. *Helicobacter pylori* infection, in particular, has been demonstrated to play a major etiologic role in the development of peptic ulcer disease, gastric mucosa-associated lymphoid tissue lymphoma, and distal gastric cancer.[2] Among Asians, *H. pylori* infection confers a greater than two-fold increased risk for developing gastric cancer.[3] High rates of mortality from stomach cancer are found to be clustered in aboriginal townships where the prevalence of *H. pylori* is high.[4] *H. pylori* infections are usually acquired in childhood and if untreated remain for the rest of an individual's life.[5,6] Therefore, the major reported risk factors for infection in developing countries are poor socioeconomic conditions and poor hygiene during childhood.[7–9]

Lanyu Island is an isolated offshore island located approximately 65 km southeast of Taiwan. The 3000 Yamis on Lanyu are Taiwan's smallest and most primitive tribe. Lanyu Island represents a closed environment, and limited information exists about the prevalence of *H. pylori* infection. To reduce the rates of *H. pylori* infection and gastric cancer requires developing appropriate strategies for prevention and intervention. To do so, we developed a study to assess additional risk factors, such as culture, transportation, lifestyle, and health behaviors relating to the disease. This study also explored whether sociodemographic characteristics and personal habits posed represented potential risk factors for *H. pylori* infection.

The ^{13}C urea breath test (^{13}C UBT) is frequently utilized as a noninvasive way to detect *H. pylori* infection in the general population.[10–12] In this study, the ^{13}C UBT was utilized to determine the prevalence of *H. pylori* infection in the inhabitants of Lanyu Island.

Patients and methods

Since 2008, we have conducted a cross-sectional study of the inhabitants of Lanyu Island, in Taitung County, Taiwan. Patients have been recruited from outpatient clinics, which were supported monthly by the Mackay Memorial Hospital (Taitung branch, Taiwan). All participants were examined at a mobile medical service after obtaining consent from the study participants or, in the case of adolescents, from their parents. We reviewed and collected their medical history about previous *H. pylori* infection or eradication. The exclusion criteria for undergoing UBT is previously receiving treatment to eradicate *H. pylori* infections. Patients with prior *H. pylori* infections did not have their *H. pylori* status rechecked by ^{13}C UBT, but they were included as positive *H. pylori* infection in this cross-sectional study for prevalence analysis.

The ^{13}C UBT was performed to detect *H. pylori* infection, and demographic data and anthropometric measurements [weight, body mass index (BMI), and waist and hip circumference] were recorded for all study participants. Patients with prior *H. pylori* infections that were eradicated were also included in the cross-sectional study. A standardized questionnaire was completed by every participant. The questionnaire sought information on socioeconomic characteristics (income and educational levels), and medical and family history (including family size and marital status). Personal habits, including smoking, alcohol consumption, and betel chewing, were also included in the socioeconomic data. This study was reviewed and approved by the Ethical Committee of Mackay Memorial Hospital, Taitung branch.

H. pylori status was assessed using the ^{13}C UBT, and a positive result indicated active *H. pylori* infection. The test detects the presence of *H. pylori* from an enrichment of breath $^{13}CO_2$, which is critically dependent on the amount of dilution by endogenous carbon dioxide (CO_2) production. A host-dependent urea hydrolysis rate was calculated independently for each study participant. The ^{13}C UBT was administered using 75 mg of ^{13}C-urea dissolved in 200 mL of water. Breath samples were collected prior to and 30 minutes after drinking water. Breath samples were analyzed using a nondispersive infrared spectrometer, and the results were considered positive when delta over baseline was $> 4.0‰$.[13] The weight, height, and hip and waist circumference of each participant were recorded at the visit when the ^{13}C UBT was performed. BMI was calculated as body weight divided by height squared (kg/m^2).

To sample a broader age range, we pooled data collected previously from 106 high school students (55 boys and 51 girls, with a mean age of 14.3 ± 1.4 years).[14] High school students have relatively lower BMIs and wrist and hip circumferences, and use less betel and consume less alcohol than adults. In addition, teens' overall marital status is different from that of adults. We did a subgroup analysis of the 690 adults to assess the potential risk factors for *H. pylori* infection, such as lifestyle, health behaviors, and socioeconomic characteristics. Smoking criteria was divided into two categories: current smoker or ex-smoker/never smoked. Alcohol consumption was also divided