Helicobacter pylori Infection among Aborigines (the Orang Asli) in the Northeastern Region of Peninsular Malaysia

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Abstract. Whether the exceptionally low prevalence of *Helicobacter pylori* (HP) infection reported among Malays is also present among aborigines (the Orang Asli) living in northeastern Peninsular Malaysia is unknown. We studied asymptomatic Orang Asli from settlements situated 210 km from the city of Kota Bharu. The HP infection status was confirmed by a validated serology test. Nineteen percent of 480 Orang Asli tested positive for HP infection. The prevalence was 40.6% in the birth cohort of the 1940s and declined steadily in later cohorts to under 10% among 12–30 year olds. This may be related to the phases of relocation from the jungles into resettlement camps and ultimately into designated villages near rivers. The low prevalence pattern after the 1970s was probably partly a result of improvement in sanitation and hygiene practice in these villages but other unidentified factors may also be operating.

SHORT REPORT

Epidemiologic data from Malaysia have repeatedly confirmed a low prevalence of *Helicobacter pylori* (HP) infection in the Malays compared with Indian and Chinese immigrants.^{1–6} The low prevalence of HP infection is consistent with evidence dating back to the early twentieth century that showed both peptic ulcer and gastric cancer were rare in the Malays but not in the Indian and Chinese migrant population.^{7,8} *Helicobacter pylori* infection among the aboriginal population of Malaysia has not been systematically studied. There are three major tribes of Orang Asli in Peninsular Malaysia, namely Negritos, Senoi, and Proto-Malays.^{9,10} The Temiar are a major tribal group of the Senoi and are mainly found in the jungles of northeastern Peninsular Malaysia bordering the states of Kelantan and Perak (Figure 1). Forced resettlement by the Malaysian government clustered most Orang Asli in less remote villages along with basic education and healthcare facilities. However, most remain illiterate and their understanding of personal hygiene and sanitation is rudimentary. They inhabit shared longhouses that are overcrowded with many families. One would suspect that these living conditions would foster the spread of HP infections. We report herewith data concerning the prevalence and predictors of HP infection among a subset of asymptomatic Orang Asli population in northeastern Peninsular Malaysia.

We studied Orang Asli living near Kg Kuala Betis in the southern district of Gua Musang in the state of Kelantan in northeastern Peninsular Malaysia. The town of Gua Musang is 180 km south of the capital city Kota Bharu (Figure 1). Kg Kuala Betis is the base for the office of Orang Asli Welfare Department or Jabatan Hal Ehwal Orang Asli (JHEOA). The study location consisted of three Orang Asli settlements/villages or “Pos” situated 10–30 km from Kg Kuala Betis in an area accessible only by four-wheel drive vehicles. The total population of Orang Asli in these blocks was 6,000. Screening took place in 2001 after official clearance from the JHEOA

and data collection was completed in 2002. All subjects were > 12 years of age and randomly selected from households in the villages to reach a sample size of 480 subjects. This sample size was calculated using PS software to achieve a power of 80% and precision of 0.05. Because of problems with literacy, verbal informed consent was obtained after explanation of study procedures. Children were recruited only after parental consent was given. The study was reviewed and approved by the Human Ethics Committee of Universiti Sains Malaysia (USM) and supported by a USM short term grant.

A detailed investigator-directed questionnaire was administered to each subject with the help of an Orang Asli interpreter. The questionnaire included age, sex, place of birth, marital status, occupation, religion, educational level, total household occupants, smoking status, alcohol consumption, herbal plants and roots usage, source of water supply, eating exotic food from the jungle (including porcupines and tapirs), consumption of “budu” (a local anchovy sauce eaten only by the people in Kelantan), boiling of drinking water, previous history of gastrointestinal symptoms (dyspepsia, haematemesis, melaena and water brash), family history of gastric disease and past medical history (hypertension, diabetes mellitus, and coronary heart disease). *Helicobacter pylori* status was determined using a commercially available enzyme-linked immunosorbent assay (ELISA) serology test for immunoglobulin G (IgG) antibody (Uni-Gold *H. pylori* test; Trinity Biotech, UK).¹¹ Blood samples (2.5 mL) were drawn from each subject and either analyzed on site or stored between 2 and 8°C until analysis. A titer of 1:300 or higher for IgG antibody was regarded as indicating HP infection. This cutoff value had been validated earlier in a group of 40 subjects in Universiti Sains Malaysia who had undergone upper endoscopy. Statistical analysis was performed using the computer package SPSS for Windows (version 11.0, SPSS, Inc, Chicago, IL). Simple logistic regression analysis was used to assess the association between possible variables with HP infection. Multiple logistic regression analysis (forward LR method) was performed when differences in key variables of infection were identified from simple logistic regression analysis.

We recruited 480 subjects from the three Orang Asli settlements with a mean age of 31 ± 13 years (range 13–87 years). There were almost equal number of males (47.1%) and

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FIGURE 1. Map of Peninsular Malaysia showing the northeastern region (State of Kelantan) and Kg Kuala Betis in Gua Musang district where the Orang Asli subjects were recruited.

females. The majority of subjects were born (88.5%) and raised (98.5%) in Kelantan. However, place of birth had no influence on infection rates as shown in Table 1. Many were jungle product collectors (33.5%) and 40.2% received no education or only primary education (58.3%). The subjects lived in large families with 92.3% having more than eight members per family. Government supplied piped water was accessible to only 37.1% of subjects. Most were smokers (61%) but only 7.5% drank alcohol. Out of 480 subjects, 19% tested positive for *HP* infection using the serology test. Prevalence by birth cohorts is shown in Figure 2. A higher prevalence was observed among birth cohorts in the period between 1940s through 1960s (13/32 subjects or 40.6% in 1940s, 26/75 subjects or 34.7% in 1950s, and 26/116 subjects or 22.4% in 1960s) but fell to below 10%

after the 1970s (9/138 subjects or 6.5% in 1970s and 8/102 subjects or 7.8% in 1980s). Importantly, most of those 60 or older in the period between 1910s and 1930s had an *HP* prevalence of 9/17 or 52.9%. Because they lived through the relocation periods and were exposed to the younger cohorts, it is not possible to know the preresidence prevalences. Because of differences in key variables from simple logistic regression analysis, we performed multiple logistic regression analysis (forward LR method) with positivity for *HP* infection as the dependent variable and age, sex, occupation, educational level, number of family members in each household, smoking status, alcohol consumption, herbal plants and roots use, source of water supply, diet of exotic foods and family history of gastric disease as the independent variables (Table 2). Older age (odds ratio

TABLE 1

Risk factors for *HP* infection among Orang Asli tribes in northeastern peninsular Malaysia

A: Simple logistic regression analysis			
Factor	OR	95% CI for OR	P value
Age (years)	1.065	1.045–1.085	0.001
Birth place (Kelantan vs. others)	0.818	0.412–1.623	0.566
Gender (male vs. female)	1.648	1.039–2.612	0.034
Occupation: farmer	2.478	1.311–4.683	0.005
Occupation: jungle	1.641	1.029–2.619	0.038
Occupation: student	0.319	0.124–0.818	0.017
Any education	0.209	0.127–0.344	0.001
Total household occupants	1.198	1.004–1.430	0.045
Smoking	4.405	2.409–8.055	0.001
Alcohol consumption	3.033	1.486–6.192	0.002
Herbal plants and roots use	5.574	3.179–9.771	0.001
Eating budu	0.627	0.238–1.654	0.346
Eating exotic foods	3.156	1.405–7.087	0.005
Family history of gastric disease	2.126	1.306–3.462	0.002
Government piped water source	0.511	0.305–0.854	0.010
B: Multiple logistic regression analysis			
Factor	OR	95% CI for OR	P value
Age (years)	1.043	1.018–1.068	0.001
Any education	0.481	0.256–0.901	0.022
Family size	1.215	1.007–1.465	0.042
Herbal plants and roots use	2.115	1.077–4.156	0.030
Government piped water source	0.544	0.301–0.984	0.044

*OR = odds ratio; CI = confidence interval; P value is significant if $P < 0.05$.

[OR] 1.04; 95% confidence interval [CI] = 1.02–1.07), a history of herbal plants and root use (OR 2.11; 95% CI = 1.08–4.16), and a large family size (OR 1.21; 95% CI = 1.01–1.47) were strong predictors of infection (Table 1). Any formal education and use of government piped water source were protective factors against *HP* infection.

The prevalence of *HP* infection among Malays in the northeastern region is exceptionally low^{1–3,12} and of interest. A recent study found the majority of *HP* strains obtained from the Malays were the same origin as those of immigrant Indians suggesting that infection among Malays was acquired after

mixing with immigrant populations.^{13,14} *Helicobacter pylori* prevalence in the Orang Asli was high in the birth cohort of the 1940s and declined rapidly in subsequent birth cohorts to less than 10% in those born in the 1970s and 1980s (Figure 2). We speculate the pattern reflected acquisition of the infection during periods of aboriginal contact with outsiders. The period from 1948–1960 saw the forced relocation of the Orang Asli from the interior jungles into less remote resettlement camps as a consequence of the conflict between the British colonial government and communist insurgents.¹⁵ They were later relocated to designated villages that initially had poor sanitation and hygiene with water being obtained mainly from rivers with adjacent primitive toilets. Improved provision of clean water and better toilet facilities in the villages from the 1970s onward may partly explain the decline in *HP* prevalence.^{16,17} However, the extraordinarily low *HP* infection rates among 12–30 year olds in a community that remains among the most socioeconomically disadvantaged in the country suggests that there are as yet unknown factors that limit the transmissibility of the bacteria in the area.

Attempts to explore why Orang Asli have a “natural” low prevalence of *HP* have not identified any specific responsible factor. Of interest, eating exotic rare jungle animals (porcupines and tapirs) appeared to increase the risk of *HP* infection but it is considered unlikely that the wild animals harbor the infection. It is possible however that shared use of blow pipes made from bamboo to hunt jungle animals or shared food utensils favor *HP* infection. Herbal plants and roots use appeared to increase the risk of *HP* infection as did ingestion of alcohol. Both can damage the gastric mucosa but could just as likely be markers for other practices.¹⁸ More likely, both practices were associated with shared utensils or other traditional methods of preparation which favor *HP* infection.

The study limitations include convenience sampling because of the logistic difficulties of communication, transportation, and access to the Orang Asli. However, we made all possible efforts to gather a sample from as many households as possible from the three settlements. In addition, even with the help

FIGURE 2. Graph showing *Helicobacter pylori* infection rate in Orang Asli (%) according to birth cohorts in years. Infection rates in Orang Asli showed a decreasing trend across three different periods with the lowest rates reported in birth cohorts after the 1970s when the state of sanitation and hygiene were better after resettlement to villages program implemented by government.

TABLE 2

Characteristics of *HP* infected and non-infected groups among Orang Asli tribes in northeastern peninsular Malaysia*

Factor	HP + ve (N = 91)	HP - ve (N = 389)
Age (years) (mean $\pm$ SD)	39.9 $\pm$ 14	28.9 $\pm$ 12
Birth place (% in Kelantan)	86.8	88.9
Gender (% of male)	57.1	44.7
Occupation: farmer (%)	18.7	8.5
Jungle product collector (%)	42.9	31.4
Student (%)	5.5	15.4
Housewife (%)	27.5	37.5
Not working (%)	3.3	4.6
Other (%)	2.2	2.6
Education: none (%)	70.3	33.2
Primary (%)	28.6	65.3
Secondary (%)	0	1.5
College or university (%)	1.1	0
Total household occupants (mean $\pm$ SD)	9.1 $\pm$ 1	8.8 $\pm$ 1
Smoking (%)	84.6	55.5
Alcohol consumption (%)	15.4	5.7
Herbal plants and roots use (%)	34.1	8.5
Eating budu (%)	5.5	8.5
Eating exotic foods (%)	92.2	79.2
Family history of gastric disease (%)	69.2	51.4
Past history of dyspepsia (%)	45.1	18.8
Government piped water source (%)	25.3	39.8

*N = number of Orang Asli subjects; SD = standard deviation; + ve = positive; - ve = negative.

of an interpreter, complete data acquisition from the questionnaire was not always possible. Even though the serology kit for *HP* IgG was validated with good sensitivity and specificity, a combination of tests might have improved detection rates. The determination of strain would be extremely helpful but obtaining the tissues for testing was limited by logistic and ethical issues.

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