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Epidemiology of *Helicobacter pylori* among multiracial community in Northern Peninsular, Malaysia: effect of age across race and gender

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ABSTRACT

Objective: To study the epidemiology of *Helicobacter pylori* (*H. pylori*) infection according to age group. **Methods:** *H. pylori* infection data among 1 965 consecutive patients referred to the Endoscopy Unit collected at Sungai Petani Hospital for oesophagogastro–duodenoscopy (OGD). The patients were divided into 9 age groups (10–19, 20–29, 30–39, 40–49, 50–59, 60–69, 70–79, 80–89 and 90–99 years). In addition these groups were further divided into three minor group namely young adults (10–39), older adults (40–69) and geriatric groups (70–99). **Results:** Overall prevalence of infection of *H. pylori* was analyzed and found that the prevalence increase with age ($P < 0.05$). When the patients divided by ethnic and gender group with age, prevalence rate among young adults and older adults significantly higher ($P < 0.05$) compared to geriatric groups across all races and gender ($P < 0.05$). Furthermore, significantly higher number of males were infected compared to female ($P < 0.05$) but such trend was only observed among older adult groups. In addition, there is a significant differences in *H. pylori* infection prevalence rates among ethnic groups (highest in Indians adults, followed Chinese and low in Malays, $P < 0.05$). **Conclusions:** The overall prevalence of *H. pylori* did increase with age group across ethnicity and gender, in Northern Peninsular Malaysia.

1. Introduction

Helicobacter pylori (*H. pylori*) are a gram–negative bacillus responsible for one of the most common infections found in humans worldwide. Warren and Marshall first cultured and identified the organism as *Campylobacter pylori* in 1982[1]. *H. pylori* infection is distributed worldwide, but its prevalence changes considerably with age, ranging from less than 20% in adults aged less than 20 years to more than 60% in the population aged over 60 in developed countries[2,3]. So it is important to have good epidemiological studies in order to determine the trigger factors responsible for *H. pylori* infection and also prevent such disease associated with that infection especially early in life. Malaysia is a multiracial country, consist of three main races namely Malays, Chinese and Indians. *H. pylori* infection has widely

distributed and there is a great difference in its prevalence among all races across gender and age groups. This is because different race have exclusive habits and cultural practices peculiar to their own. The epidemiological studies on prevalence of *H. pylori* infection in Malaysia are very few. So this made it appealing to study the effect of age across race and gender in this country. The main objectives of this study were to investigate the prevalence rate of *H. pylori* infection among endoscope patient at hospital Sungai Petani, Kedah in order to determine the pattern of infection in multiracial community according to age across race and gender.

2. Materials and methods

2.1. Patients and the study protocol

This study was conducted at Sungai Petani hospital, Kedah in Malaysia. The availability facilities in Sungai Petani makes it is a referral centre for many dyspeptic and upper gastrointestinal pathology patients. In total there were 1965 consecutive patients referred to the Endoscopy

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Unit at Sungai Petani hospital for oesophagogastroduodenoscopy (OGD). All endoscopies were performed by experienced endoscopist using the Olympus GIF100 video endoscope. The patients with dyspepsia, defined as pain or discomfort centered in the upper abdomen and lasting for 1 month or more, referred by primary care physicians for upper endoscopy, are eligible for enrolment. Information on the demographic data (including ethnic, gender and age) and clinical data (type and frequency of symptoms, date of examination) were collected on a standard form and stored in a computerized archive to reveal the infection pattern in the population of Sungai Petani, Kedah. Patients were excluded if they had previous history of peptic ulcer, active bleeding, cancer or recent use of antibiotics or proton pump inhibitor (PPI). We choose to exclude patients with a previous history of peptic ulcer disease because many patients often cannot remember what treatment they have had in the past. Patients who had previous eradication therapy can bias the result.

2.2. Data analysis

Data were entered and analyzed using Statistical Package for Social Science (SPSS) for windows version 16.0. Univariate analysis was done using Fisher's exact test (2-tailed test) to determine the prevalence of *H. pylori* infection in the sampled population, and the difference in the prevalence across ethnicity, and gender⁴. The differences between means was considered significant when $P < 0.05$.

3. Results

Total of 1 965 of consecutive patients were enrolled in the study and the range of the patients was 10–99 years. These patients comprised 1051 Malays, 350 Chinese, 545 Indians and 19 others. Besides that, there were 800 female and 1 165 males.

The overall prevalence among patient with *H. pylori* infection was 30.4% (597/1 965). Table 1 shows the prevalence of *H. pylori* infection according to various range age groups (10–99 years). The age range further categorized into 3 groups 10–39, 40–69 and 70–99 years these namely young adults, older adults and geriatrics respectively. The prevalence rate of *H. pylori* infection increased with age. The prevalence rate among young adults (10–39 years) was significantly higher ($P < 0.05$) than older adults (40–69 years). The prevalence rate among young adults and geriatrics are significantly different, but the prevalence rate among older adults and geriatrics was not significant different ($P > 0.05$).

Table 1

H. pylori infection rates according to age.

Age (years old)	Total (n)	<i>H. pylori</i> absent [n (%)]	<i>H. pylori</i> present [n (%)]
10–19 ^a	95	67 (70.5)	28 (29.5)
20–29 ^a	148	88 (59.5)	60 (40.5)
30–39 ^a	190	125 (65.7)	65 (34.2)
40–49 ^b	296	210 (70.4)	86 (29.1)
50–59 ^b	478	334 (69.9)	144 (30.1)
60–69 ^b	371	262 (70.6)	109 (29.4)
70–79 ^c	277	200 (72.2)	77 (27.8)
80–89 ^c	98	72 (73.5)	26 (26.5)
90–99 ^c	12	10 (83.3)	2 (16.7)
Total	1 965	1 368 (69.6)	597 (30.4)

The prevalence rate of *H. pylori* infection among young adults was significantly lower ($P < 0.05$) than for older adults and geriatric. ^a: young adults; ^b: older adults; ^c: geriatric.

Table 2 shows the prevalence of *H. pylori* infection among endoscopy patients according to race across various age ranges. *H. pylori* infection was most commonly found among Indians. The prevalence rate among Indian older adults are significantly higher ($P < 0.05$) compared to Malay and others older adults groups.

Table 2

H. pylori infection rates in relation to ethnic and age groups.

Race	Age (years old)	Total (n)	<i>H. pylori</i> absent [n (%)]	<i>H. pylori</i> present [n (%)]
Chinese	10–19 ^a	13	8 (61.5)	5 (38.5)
	20–29 ^a	21	14 (66.7)	6 (28.6)
	30–39 ^a	26	19 (73.1)	7 (26.9)
	40–49 ^b	32	25 (78.1)	7 (21.9)
	50–59 ^b	89	64 (71.9)	25 (28.1)
	60–69 ^b	88	62 (70.5)	26 (29.5)
	70–79 ^c	49	33 (67.3)	16 (32.7)
	80–89 ^c	29	22 (75.9)	7 (24.1)
	90–99 ^c	3	2 (66.7)	1 (33.3)
Indians	10–19 ^a	21	15 (71.4)	6 (28.6)
	20–29 ^a	39	16 (41.0)	20 (51.3)
	30–39 ^a	73	44 (60.3)	29 (39.7)
	40–49 ^{b*}	103	60 (58.3)	43 (41.7)
	50–59 ^{b*}	147	97 (65.9)	50 (34.0)
	60–69 ^{b*}	91	65 (71.4)	26 (28.6)
	70–79 ^c	53	40 (75.5)	13 (24.5)
	80–89 ^c	20	14 (70.0)	6 (30.0)
	90–99 ^c	1	0 (0.0)	1 (100.0)
Malays	10–19 ^a	59	43 (72.9)	16 (27.1)
	20–29 ^a	90	57 (63.3)	33 (36.7)
	30–39 ^a	89	61 (68.5)	28 (31.5)
	40–49 ^{b*}	156	120 (76.9)	36 (23.1)
	50–59 ^{b*}	239	170 (71.1)	69 (28.9)
	60–69 ^{b*}	190	133 (70.0)	57 (30.0)
	70–79 ^c	173	125 (72.2)	48 (27.7)
	80–89 ^c	48	35 (72.9)	13 (27.1)
	90–99 ^c	7	7 (100.0)	0 (0.0)
Others	10–19 ^a	2	1 (50.0)	1 (50.0)
	20–29 ^a	1	0 (0.0)	1 (100.0)
	30–39 ^a	2	1 (50.0)	1 (50.0)
	40–49 ^{b*}	5	5 (100.0)	0 (0.0)
	50–59 ^{b*}	3	3 (100.0)	0 (0.0)
	60–69 ^{b*}	2	2 (100.0)	0 (0.0)
	70–79 ^c	2	2 (100.0)	0 (0.0)
	80–89 ^c	1	1 (100.0)	0 (0.0)
	90–99 ^c	1	1 (100.0)	0 (0.0)

The prevalence rate of *H. pylori* infection among Indians older adults was significantly higher ($P < 0.05$) than for Malays older adults and other older adults. a: young adults; b: older adults; c: geriatric.

Table 3 shows the prevalence rate according to gender across different age groups of endoscopy patients. The prevalence rate female within young adults are significantly different ($P < 0.05$) than geriatric groups. Besides that, the prevalence rate of male within young adults, older adults and geriatric was not significant ($P > 0.05$). This is because overall male prevalence rate is higher in all races and this may be involved other factors which has not been studied.

Table 3*H. pylori* infection rates in relation to gender.

Gender	Age (years old)	Total (n)	<i>H. pylori</i> absent [n (%)]	<i>H. pylori</i> present [n (%)]
Female	10–19 ^a	40	28 (70.0)	12 (30.0)
	20–29 ^a	73	48 (65.8)	25 (34.2)
	30–39 ^a	74	49 (66.2)	25 (33.8)
	40–49 ^b	129	95 (73.4)	34 (26.4)
	50–59 ^b	185	146 (78.9)	39 (21.1)
	60–69 ^b	159	124 (77.9)	35 (22.0)
	70–79 ^c	95	74 (77.9)	21 (22.0)
	80–89 ^c	39	32 (82.1)	7 (18.0)
	90–99 ^c	6	5 (83.3)	1 (16.7)
Male	10–19 ^a	55	39 (70.9)	16 (29.0)
	20–29 ^a	75	40 (53.3)	35 (46.7)
	30–39 ^a	116	76 (65.5)	40 (34.5)
	40–49 ^b	167	115 (68.9)	52 (31.1)
	50–59 ^b	293	188 (64.3)	105 (35.8)
	60–69 ^b	212	138 (65.1)	74 (34.9)
	70–79 ^c	182	126 (69.2)	56 (30.8)
	80–89 ^c	59	40 (67.8)	19 (32.2)
	90–99 ^c	6	5 (83.3)	1 (16.7)

The prevalence rate of *H. pylori* infection among young adults, older adults and geriatric were significantly different ($P < 0.05$) for the female group. ^a: young adults; ^b: older adults; ^c: geriatric.

4. Discussion

In this studies the prevalence of *H. pylori* infection was determine among the population with respect to ethnic, gender a cross different age groups in Sungai Petani, Kedah, Northern Peninsular Malaysia. Basically Malaysia is multiracial country consist of three main ethnic groups, namely Malay, Indian and Chinese. Although three different races living together but they have exclusive habits and cultural practices to their own. Based on this study the prevalence of *H. pylori* infection and its distribution are varies among different ethnic, gender across different age groups. The epidemiological studies have documented significant difference in the prevalence of *H. pylori* infection in different population across various age groups. Basically, the overall prevalence of *H. pylori* infection among Sungai Petani population shows 30.4% (597/1 965). The prevalence rate among young adults was significantly higher ($P < 0.05$) than older adults. This may due to the association of several risk factors related to *H. pylori* infection.

So far, there are several risk factors which is associated with infection of *H. pylori* in childhood have been documented in developing countries, this included overcrowding, poor hygiene, unclean water, sharing beds during childhood and lack of maternal education as well[5–7]. Besides that, there are other factors as well which is dramatically associated with an increased risk of acquiring *H. pylori* in childhood have been reported in developing countries Vietnam, India and South Africa. This included family member with *H. pylori*, pre-mastication of food by mother, mother breast-feeding with saliva-coated nipples, direct transmission through overcrowding have been cited as an important risk factors for early childhood infection in developing countries low education level in parents and ethnicity[8,9].

Apart from that, in this study the prevalence of *H. pylori* within young adults is varies across different races (Malays, Indians, and Chinese). As the prevalence rate in Indian and

Chinese communities, who are likely to be mostly infected in young adults, is much greater than that seen in the Malay communities. So, this would be expected higher prevalence rate during adults in the Indians and Chinese compared to Malays communities in this study. The increased in risk factor for childhood infection in Indian and Chinese compared to Malays may be due to different socio-cultural practices peculiar to each race[10]. Also religious rituals and diet are among other factors that should be studied. Furthermore, another strong plausible explanation as to the wide difference in infection rates among the races is might be due to inherent genetic predisposition which plays a role in host-bacterium interaction[11]. Apart from that, in Bangladesh, Hindu mothers, in contrast to Muslim mothers, regularly coat their nipples with saliva before breast feeding[9]. While possibly a chance finding, a study found the prevalence of *H. pylori* to be higher among the Hindus babies than among Muslim babies in rural Bangladesh and could be support a finding of oral-oral transmission. Also Pre-mastication of food has been found in both Bangladesh and Ethiopia to be associated with an increased prevalence of *H. pylori* in babies[9].

Besides that, the previous study in Malaysia found that, under similar economic and living conditions, people of Malay ancestry were significantly less likely to be infected than Chinese and Indian population in the same region of Malaysia[12]. So this evidence strongly support that, the prevalence of *H. pylori* infection varies widely by geographic region in the same country which seen in Malaysia. A second study of asymptomatic children of different ethnic backgrounds but all born and raised in Belgium found that the Caucasian children were significantly less likely to be infected than the non-Caucasian children[13]. This may be true racial or ethical predisposition to infection with *H. pylori* also might be due to unrecognized environmental or behavioral differences[14,15].

Apart from that, in this study the prevalence rate among Indian older adults are significantly higher than Chinese and Malay older adults compared to previous reports of patient who have undergo endoscopy in Kelantan[4,16], Kuala Lumpur[17]. In contrast, the study in Northern Eastern Peninsular Malaysia has reported low prevalence. So pattern and distribution of *H. pylori* infection among different ethnic across different age groups are varies and this may provide valuable insights into the possible modes of transmission of the organism. There are various study have done in Malaysia and Singapore whereby both countries consist of three races (Malays, Chinese and Indians) all report have consistently shown a higher prevalence of *H. pylori* infection among non-Malays compared to Malays[4,12,18–20]. This most probably contribute by different socioeconomic and socio-cultural practices. Another contributory factor may be the Chinese and Indians in Malaysia are immigrant races that brought the infection from their home countries[21].

Malaysia is a multiracial country where three major Asian races live together: Malay, Chinese and Indian. The latter 2 groups are the descendants of late nineteenth and early twentieth century immigrants from China and India. A 'racial cohort' phenomenon has been postulated whereby the infection is transmitted and perpetuated within a racial group and the prevalence amongst Chinese and Indians in Malaysia reflects the prevalence in South China and South India, respectively. It has been suggested that the higher infection rates among the Chinese and Indians reflect the high prevalence rates in their countries of origin, and that the original immigrants passed the high infection rates to successive generations of their children born in Malaysia.

These statements support the belief that *H. pylori* infection acquired early in life leads to multifocal gastritis and thus predisposes the patients to symptoms later in life[22]. These people may have been infected previously without any symptoms, because *H. pylori* needs time to produce those symptoms[22]. We can postulate that when Indian and Chinese migrate from South India and South China during the prevalence of *H. pylori* infection in South China and South India very high, they are infected with *H. pylori* but without any symptoms and developed symptom later in life after them being in Malaysia for long time and showed a high prevalence in Malaysia.

Our finding also showed that the overall prevalence rate of *H. pylori* infection was significantly higher ($P<0.05$) among males compared with females. Apart from that, older adult male more likely to be infected compare to geriatric males. These may be due to male's lifestyle and habits which include smoking and alcohol consumption[23], could be a trigger factor for the infection of these bacteria during childhood and developed symptom later in life. Since, smoking and drinking alcohol within Malay community is prohibited by the rules of Islam, so this might be the factor causing *H. pylori* infection prevalence to be low compared with those of the Chinese and Indian community[24]. There was another recent study has reported that, the cigarettes smoked also associated with *H. pylori* infection[14,17].

Overall the prevalence of *H. pylori* infection within endoscope patients in this study is 30.4%. There is a significant and consistent difference in *H. pylori* infection prevalence among the various ethnic groups across various age ranges in Malaysia. The prevalence rates were shown to increase with age among races and between genders.

Conflict of interest statement

We declare that we have no conflict of interest.

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