Prevalence of Helicobacter pylori in Peptic Ulcer Disease in a Singapore Hospital

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ABSTRACT

Introduction: High Helicobacter pylori (H. pylori) prevalence is well documented among peptic ulcer patients. However, there have been recent reports of declining H. pylori infection rates in developed countries. Based on previous local data in a different hospital, H. pylori prevalence was 66% in gastric ulcer, 86% in duodenal ulcer and 75% in combined gastric and duodenal ulcers. Our present study aims to review the recent H. pylori prevalence in peptic ulcer patients in a Singapore hospital. H. pylori infection rate in relation to sex, age, non-steroidal anti-inflammatory drug (NSAID) use and race were also examined.

Methods: Over a 6-month period, patients diagnosed with peptic ulcer by oesophagogastroduodenoscopy were selected. Relevant information was obtained from case notes retrieved from the Medical Records Office. H. pylori status was assessed by rapid urease test (CLOtest) and/or histology. Exclusion criteria were[1] history of peptic ulcer[2], active bleeding[3], cancer or[4] recent use of antibiotics or proton pump inhibitors.

Results: 107 peptic ulcer patients were selected; 53 gastric ulcer, 47 duodenal ulcer and 7 with combined gastric and duodenal ulcers. Overall H. pylori prevalence was 67.9%[36/53], 85.1%[40/47] and 85.7%[6/7] respectively. Except for the gender variable in gastric ulcer group, age, race and NSAID use was not found to influence H. pylori prevalence.

Conclusions: The prevalence of H. pylori among our peptic ulcer patients is slightly lower compared to overseas studies but the local trend, when compared indirectly to another previous local study did not appear to have changed much. Reasons for the lower H. pylori infection rate in comparison to overseas studies are discussed. The lower H. pylori prevalence among female gastric ulcer patients may be due to the higher prevalence of NSAID use.

Keywords: Helicobacter pylori, peptic ulcer, prevalence, Singapore

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INTRODUCTION

Helicobacter pylori (H. pylori) plays a pivotal role in the aetiology of a number of gastroduodenal diseases[1] and eradication of the infection has been known to alter the course of peptic ulcer by promoting ulcer healing, reducing the ulcer recurrence rate and its complications[2-5]. In recent years, with a greater sample size and better experience with the diagnosis of H. pylori infection, H. pylori prevalence has been consistently reported to be over 90% in duodenal ulcer (DU) and over 80% in non-NSAID (non-steroidal anti-inflammatory drugs) induced gastric ulcer (GU)[6]. In contrast, a declining H. pylori infection rate among peptic ulcer patients has been observed elsewhere[7-9].

In a previous study by Kang et al[10] about a decade ago on Singaporean patients, the H. pylori infection rate was identified only in 66% of patients with GU, 86% of patients with DU and 75% with combined GU & DU. As the recent trend of H. pylori prevalence in our local peptic ulcer population has not been re-examined, we aimed to retrospectively determine the recent prevalence of H. pylori among peptic ulcer patients in a hospital setting. H. pylori prevalence was also assessed in relation to patients' age, sex, race and NSAID use in this study.

METHODS

Between July 1997 to December 1997, consecutive patients who underwent oesophagogastroduodenoscopy (OGD) and diagnosed with peptic ulcer at Tan Tock Seng Hospital, Department of General Medicine, were considered for inclusion into the study. In all these patients, OGD was done as a diagnostic workup of symptoms such as dyspepsia, epigastric pain, gastrointestinal bleeding or anaemia. Case notes of patients were retrieved from the Medical Records Office and their demographics, diagnosis, H. pylori status, medication history and other relevant clinical data were recorded. Patients were excluded if they had (i) previous history of peptic ulcer (ii) active bleeding (iii) cancer or (iv) recent use (within 4 weeks) of antibiotics or proton pump inhibitors (PPI). H. pylori was considered present

if the rapid urease test (CLO test) and/or histology tests proved positive. We chose 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 have had previous eradication therapy may bias the result.

Statistical Analysis

Fisher exact test (2-tailed test) was used to assess the independent effect of age (≥50 vs <50 years old), sex, race (Chinese vs Non-Chinese eg. Malays, Indians, others) and NSAID use on H. pylori prevalence. Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) Version 8.0. Statistical significance is taken at 0.05.

RESULTS

120 patients with peptic ulcers were eligible for the study during the six-month period. 2 patients were excluded because of a past history of peptic ulcer and 5 patients because of recent antibiotic use or active bleeding. Of the 113 peptic ulcer patients selected, 6 patients (3 GU, 2 DU and 1 GU & DU) were further excluded due to missing data on H. pylori status (H. pylori status was either not documented or not established). Data analysis was then carried out on the remaining 107 patients. Among these patients studied, 53 had GU, 47 with DU, and 7 had both GU & DU. There was a greater proportion of Chinese and males with peptic ulcers (Table I).

Table I. Clinical features and demographics of patients.

	Gastric Ulcer (n=53)	Duodenal Ulcer (n=47)	Gastric & Duodenal Ulcer (n=7)
Age (median)	62	49	65
Range	25-83	18-87	50-83
Sex			
Male	29 (54.7%)	27 (57.4%)	4 (57.1%)
Female	24 (45.3%)	20 (42.6%)	3 (42.9%)
Race			
Chinese	45 (84.9%)	38 (80.9%)	5 (71.4%)
Indians	4 (7.5%)	4 (8.5%)	1 (14.3%)
Malays	4 (7.5%)	2 (4.3%)	1 (14.3%)
Others	–	3 (6.4%)	–
NSAID use	17 (32.1%)	10 (21.3%)	1 (14.3%)

Table II. Prevalence of Helicobacter pylori in Peptic Ulcer Disease.

	Helicobacter Pylori Prevalence	
	Include NSAID users	Exclude NSAID users
Gastric Ulcer	67.9% (36/53)	72.2% (26/36)
Duodenal Ulcer	85.1% (40/47)	86.5% (32/37)
Gastric & Duodenal Ulcer	85.7% (6/7)	83.3% (5/6)

Prevalence

From our analysis, the overall H. pylori prevalence in GU, DU and combined GU & DU were 67.9% [36,53], 85.1% [40,47] and 85.7% [6,7] respectively. Among the 53 GU patients, 17 were NSAID users, 10 of whom were tested positive for H. pylori. In the DU group, 10 of 47 were NSAID users and of whom 8 were also H. pylori positive. There was only 1 NSAID user in the combined GU & DU group and the patient was H. pylori positive as well. Altogether, 12 patients (7 GU and 5 DU) had neither evidence of H. pylori infection nor NSAID use.

When NSAID users were excluded from the analysis, the H. pylori prevalence among GU patients increased from 67.9% to 72.2%. On the other hand, H. pylori infection rate increased only slightly to 86.5% [32,37] in the DU group from 85.1%. H. pylori prevalence was 83.3% among patients with combined GU & DU after the exclusion of NSAID users (Table II). NSAID use was present in 32.1% of GU, 21.3% of DU and 14.3% of combined GU & DU.

Test of Independence (Fisher Exact Test)

In our study, H. pylori prevalence in the gastric and duodenal ulcer groups was found to be independent of age, race, and NSAID use. Interestingly, there were more male GU patients who were H. pylori positive. No such relation was found for the DU group (Table III). Statistical test was not carried out for the combined GU & DU group due to small sample size.

DISCUSSION

The results from this study, although reflecting only the point prevalence of H. pylori infection (GU 67.9%, DU 85.1%) in peptic ulcer patients in our hospital during the six-month recruitment period, was similar to that reported in a previous local study[10], approximately a decade ago. Even though the latter study was done in another hospital using different criteria for recruitment, the patients studied are likely to come from similar ethnic and disease background. Thus, from a historical perspective, there does not appear to be a change in the H. pylori prevalence trend in the last decade in Singapore.

The local H. pylori prevalence rate was lower than some overseas prevalence studies[6] which had suggested that greater than 90% of all DUs and greater than 80% of all GUs were associated with H. pylori infection. Apart from genetic and socio-economic factors, several other possibilities may account for the variations in prevalence in different studies.

Table III. Helicobacter pylori prevalence in relation to age, sex, race and NSAID use.

		Gastric Ulcer (n=53)		Duodenal Ulcer (n=47)	
	Variables	**HP+ve**	**P value**	**HP+ve**	**P value**
Age	**≥50**	28/42 (66.7%)	P=1.000	18/23 (78.3%)	P=0.245
	<50	8/11 (72.7%)		22/24 (91.7%)	
Sex	**Male**	27/29 (93.1%)	P=0.000	24/27 (88.9%)	P=0.438
	Female	9/24 (37.5%)		16/20 (80.0%)	
Race	**Chinese**	**31/45** (68.9%)	P=0.701	32/38 (84.2%)	P=1.000
	Non-Chinese	5/8 (62.5%)		8/9 (88.9%)	
NSAID use	**Yes**	10/17 (58.8%)	P=0.360	8/10 (80.0%)	P=0.630
	No	26/36 (72.2%)		32/37 (86.5%)	

significant at 5%
HP +ve: Helicobacter pylori positive HP –ve: Helicobacter pylori negative

With the exception of a study by Borody et al[11], many reports of H. pylori prevalence in peptic ulcer patients were not informative on NSAID use in the study population. NSAID users were often not included in these studies and this might not reflect a true validation of the relationship between H. pylori infection and peptic ulcer disease. Upon excluding NSAID users from our prevalence analysis, the infection rates of H. pylori in GU increased from 67.9% to 72.2% while that for DU increased marginally from 85.1% to 86.5%.

Recently, low H. pylori prevalence in some geographical regions has been described[7-9]. The finding of increasing H. pylori negative ulcer may suggest a different pathogenesis in these patients. This also provided strong evidence that H. pylori per se may not be central to the pathogenesis of peptic ulceration in some patients. In our study, 25 patients (from 107 patients recruited) were negative for H. pylori (17 GU, 7 DU, 1 GU&DU). Of these, 7 GU and 2 DU were NSAID users. 4 patients of the H. pylori-negative group, who did not use NSAID, died during the same admission from other co-morbidities. It was possible that these patients' ulcer aetiology was stress-induced but the retrospective nature of our study did not allow us to examine this relationship further. How host and environmental factors (eg smoking, alcohol, NSAID use) modulate clinical response to H. pylori infection or cause peptic ulceration in the absence of H. pylori infection, warrant further studies.

In addition, although the prevalence of H. pylori infection has been reported to approach 100% for duodenal and 90% in gastric ulcers, the prevalence of the organism in bleeding ulcers is still not well defined, ranging from 40 - 90%[12]. Conflicting data of H. pylori infection rate has been reported in active and chronic DU[13-15]. Hence the nature of ulcer, whether complicated or uncomplicated, active or chronic, included in study may influence and cause variation in H. pylori prevalence.

Our study demonstrated that gender had an influence on H. pylori infection rate in GU patients and it appeared that Singapore females were less likely to be infected with H. pylori than males. This could be due to the higher use of NSAIDs in our female gastric ulcer population [45.8% vs 20.7%, p=0.08]. Difference in H. pylori prevalence due to gender to our knowledge has yet to be reported.

Several epidemiological studies reported that the frequency of H. pylori in asymptomatic individuals increased with age[16]. In Singapore, a review article by Fock KM revealed that seroprevalence of H. pylori infection increases with age from 3% in children below 5 years old to 71% in adults above 65[17]. Despite being more common in the older generation, this age associated increase in H. pylori prevalence was not present in peptic ulcer patients[16,18,19]. Increased ingestion of NSAIDs resulting in H. pylori negative ulcer in the older population could be a contributory factor. Moreover, the age-related increase in H. pylori prevalence is due to the fact that infection is usually acquired in childhood and carried for life, rather than a higher risk of H. pylori associated with peptic ulcer disease in the older generation.

Although our study found no difference in H. pylori infection between the young (<50 years old) and old (≥50 years old) in both GU (27.3 % vs 33.3%, p=1.00) and DU (20.8% vs 21.7%, p=1.00) groups, no significant difference in NSAID use between the two age groups was observed either. Unknown pathogenic factors causing clinical manifestation in some H. pylori infected patients but not in others may contribute to this lack of trend.

In a local study by Kang et al[20], Chinese has been observed to be most susceptible to peptic ulcer compared to other races. Although racial differences in

seroprevalence of H. pylori have been reported in Singapore, it did not correlate with and explain the higher peptic ulcer frequency among the Chinese[21]. On the other hand, H. pylori prevalence in peptic ulcer patients of different races were found to be similar, giving us no further clue on the aetiology of peptic ulcer[21]. Our present results showed no difference in H. pylori prevalence in peptic ulcer patients between the Chinese and non-Chinese as well.

It is well established that NSAIDs and H. pylori are independent risk factors for peptic ulcer. It would therefore be of interest to assess the H. pylori prevalence between NSAID and non-NSAID users in the peptic ulcer population. Our finding revealed no meaningful difference in H. pylori infection based on NSAID use.

Like any retrospective study, there may be an underestimation of NSAID, antibiotic or PPI use due to missing data. This was minimised in our study by thorough reviewing of patients' medication profiles from case notes and tracing their medication use from the pharmacy record computer system.

A limitation of this study may be the inadequate standardisation of testing such as the optimal number of antral biopsies obtained and the number of H. pylori diagnostic tests (CLOtest, histology) performed. Nonetheless, CLOtest has been rendered a highly sensitive (90-93%) and specific (93%-95%) diagnostic test[22,23]. A high specificity of 96% and sensitivity of 77% with positive and negative predictive values of 98% and 63% respectively, have been reported in a local validation of CLOtest[24]. In addition, it is unlikely that the lower H. pylori prevalence (compared to some overseas studies) obtained in this survey was due to any false negative results since patients with past history of peptic ulcer, bleeding, taking antibiotics and/or PPIs - factors which may confound H. pylori prevalence by affecting the accuracy of CLOtest[25], were carefully screened out from the study.

CONCLUSIONS

The H. pylori prevalence rate among peptic ulcer patients in our hospital was lower than that reported overseas. The possible reasons for this difference were discussed. Despite some overseas reports of declining prevalence, the H. pylori prevalence rate among peptic ulcer patients in Singapore does not appear to have changed from a historical perspective. Our study also revealed a lower H. pylori prevalence among female GU patients, probably due to their higher NSAID use.

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