

Chili—Protective Factor Against Peptic Ulcer?

J.Y. KANG, MD, K.G. YEOH, MBBS, H.P. CHIA, MBBS, H.P. LEE, MBBS, Y.W. CHIA, MBBS, R. GUAN, MBBS, and I. YAP, MBBS

The aim of the present study was to determine the frequency and amount of chili taken by peptic ulcer patients and control subjects. One hundred three Chinese patients with peptic ulcer and 87 control patients were interviewed using a standard questionnaire. Those subjects who deliberately avoided chili use because of symptoms or advice from friends or medical practitioners were excluded. The median number of times of chili use per month was eight in the ulcer group (25–75% quartiles 1–30) compared to 24 (8–56) in the control group ($P < 0.001$). The median amount of chili used per month was 312 units (25–75% quartiles 38–899) in the ulcer group compared to 834 units (274–1892) in the control group ($P < 0.001$). The odds ratio of having peptic ulcer disease, adjusted for age, sex, analgesic use, and smoking by multiple logistic regression, was 0.47 (95% confidence intervals: 0.25–0.89) for subjects who had a higher intake of chili both in terms of frequency as well as amount used compared to those who took less chili. Our data support the hypothesis that chili use has a protective effect against peptic ulcer disease.

KEY WORDS: peptic ulcer; chili; capsaicin; diet.

The Singapore population comprises three different races: Chinese, Malays, and Indians. Peptic ulcer is more common in Chinese compared to Malays and Indians (1, 2). The differences between Chinese and Malays in the incidence of perforated peptic ulcer has decreased over a period of three decades, indicating that at least part of the racial difference is attributable to environmental rather than genetic influences (2). Diet is one environmental factor that has been implicated in the causation of peptic ulcer (3). Although in recent years the dietary habits of Singaporeans of different races have tended to become more uniform,

one difference is that Malays and Indians traditionally use more chili than Chinese. Therefore, one possible explanation for racial differences in peptic ulcer frequency in Singapore is a protective effect of chili.

Capsaicin, the pungent ingredient of chili, has been shown in recent years to protect the gastric mucosa against experimental injury induced by alcohol and nonsteroidal antiinflammatory drugs (4, 5). We have recently demonstrated that this protective effect is reproduced by chili powder (6). We have also demonstrated a protective effect of chili powder against aspirin-induced gastric mucosal injury in humans (7). These observations are not directly applicable to peptic ulcer in humans. However, with the epidemiological observations described earlier, they are compatible with the hypothesis that chili ingestion has a protective effect against peptic ulcer disease. We have therefore performed a study to determine the amount of chili used in Chinese patients with peptic ulcer compared to those with miscellaneous medical illnesses.

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From the Division of Gastroenterology, Department of Medicine, Department of Community, Occupational and Family Medicine, and Department of Surgery, National University of Singapore, Singapore.

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Address for reprint requests: J. Y. Kang, Division of Gastroenterology, Department of Medicine, National University Hospital, Lower Kent Ridge Road, Singapore 0511.

MATERIALS AND METHODS

Consecutive Chinese patients diagnosed to have peptic ulcer in the departments of medicine and surgery were studied. Diagnosis was by endoscopy or at operation (for perforated ulcers). A standard dietary questionnaire was administered by one of two trained interviewers. Each subject was asked the number of times per month they had used chili in the last two years preceding diagnosis of ulcer disease. The subjects were asked about their habitual amounts of chili intake in terms familiar to them and according to local habits of consumption. For instance, much chili is consumed locally in the form of dips and sauces. Subjects were shown typical sizes of the latter and asked to quantitate their intake in those terms. The final amount of chili intake included all common local dishes and condiments containing chili (chili powder, chili sauce, fresh chili, curry powder, mee siam, nasi lemak, curry, satay). Volumes of the various receptacles in which chili was consumed were converted to the smallest common volume, ie, the teaspoon (or one "unit"). The final amount of chili intake was expressed in multiples of the latter. Each patient was asked if chili caused any symptoms and if chili use was avoided either because of these symptoms or because of advice from medical practitioners, friends or the press. Patients who have avoided chili for these reasons were excluded from the study.

Chinese patients admitted to the Department of Medicine during the study period with acute medical illnesses were used as controls. These patients must not have had any history of peptic ulcer or dyspepsia requiring medical attention. Patients with renal failure or hepatic failure requiring dietary modifications were excluded from the study. Patients with gastrointestinal tract cancer were also not studied, since the frequency of these cancers also shows racial differences similar to the situation in peptic ulcer (8).

Differences in the frequency of chili use and the amount of chili used were compared between groups using the Wilcoxon rank-sum test (9). The correlation between age and chili consumption was assessed using the Spearman test (9). All statistics were calculated using the SAS program (SAS Institute, Cary, North Carolina). Median values for the amount and frequency of chili intake, respectively, were derived for the study population. Those whose chili intake exceeded the median values for amount and frequency of chili intake, respectively, were classified as high intake and those whose chili intake was less than the median values were classified as low intake. The crude odds ratio for ulcer disease for high intake vs low intake was calculated. Adjusted odds ratios were obtained by correcting for age, sex, analgesic use, and smoking using the logistic regression model.

RESULTS

There were 204 patients with peptic ulcer (gastric ulcer 60, duodenal ulcer 132, gastric and duodenal ulcer 12). Of these 52 (25%) avoided chili because of symptoms produced by chili (gastric ulcer 14, duodenal ulcer 34, gastric and duodenal ulcer 4), while another 49 (24%) avoided chili because of advice

TABLE 1. PATIENT DEMOGRAPHY AND CHILI USE

	Peptic ulcer	Control
Number	103	87
Sex (M:F)	73:30	58:29
Age (years, mean \pm SD)	52 \pm 15.3 ^{a†}	42.8 \pm 14.5 ^a
Smokers [N (%)]	40 (39)	18 (21)
Drinkers [N (%)]	32 (31)	37 (43)
Analgesic users [N (%)]	4 (4)	7 (8)
Dyspepsia [N (%)]	72 (69)	45 (52)
Frequency of chili use (times per month)*	8 (1-30) ^b	24 (8-56) ^b
Amount of chili use (units per month)*	312 (38-899) ^c	834 (274-1892) ^c

* Median (25% and 75% quartiles).

† ^a, $P < 0.001$; ^b, ^c, $P < 0.001$.

from others or the belief that chili would exacerbate ulcers or was otherwise detrimental to health (gastric ulcer 20, duodenal ulcer 26, gastric and duodenal ulcer 3). For control patients, 33 of 138 subjects (24%) avoided chili because of various symptoms, while 18 (13%) avoided chili because of anxiety about its effect on health. Therefore, data from 103 peptic ulcer patients and 87 controls were available for analysis.

Patients with peptic ulcer and miscellaneous illnesses showed similar sex distributions, but peptic ulcer patients were significantly older than the controls (Table 1). Both the frequency of chili use and the amount of chili used were significantly greater in the control group (median frequency 24 per month, median amount 834 units per month) compared to patients with peptic ulcer (8 and 312, respectively; $P < 0.001$ in both cases). Considering the two groups together, both the frequency of chili use and the amount of chili used were inversely related to age ($r = -0.32$ and -0.35 , respectively; $P < 0.001$ in each case). There was no significant difference in the frequency of chili use or the amount of chili use between patients with gastric ulcer ($N = 26$, median frequency 5 times per month, median amount 175.5 units per month) and those with duodenal ulcer ($N = 72$, median frequency 12, median amount 372.5).

The crude odds ratios for the risk of having peptic ulcer was 0.42 (95% confidence intervals 0.23-0.75) for subjects whose frequency of chili use exceeded the median compared to those who took chili less frequently, and 0.36 (0.21-0.67) for those who took more than the median amount of chili compared to those who took less. Adjusted odds ratio, corrected for age, sex, smoking, and analgesic use, was 0.47 (0.25-0.89) both for the frequent users compared to infrequent users and for those who used greater

TABLE 2. CRUDE AND ADJUSTED ODDS RATIO FOR ULCER DISEASE IN HIGH-INTAKE VS LOW-INTAKE GROUPS

	<i>Crude odds ratio (95% confidence intervals)</i>	<i>Adjusted odds ratio (95% confidence intervals)</i>
High intake vs low intake by amount*	0.360 (0.205 to 0.666)	0.472 (0.249 to 0.892)
High intake vs low intake by frequency†	0.417 (0.232 to 0.749)	0.468 (0.246 to 0.889)

* High: amount >477.5 units; low: amount ≤477.5 units.

† High: frequency >16; low: frequency ≤16.

amounts compared to those who had used chili in smaller amounts (Table 2).

Although we have excluded patients who admitted to deliberate restriction of chili intake because of symptoms or advice, we considered the possibility that unintentional restriction of intake could still occur because of symptoms. We therefore considered separately the chili use of those who had dyspepsia ($N = 72$) and those who had no dyspeptic symptoms ($N = 31$). The median frequency of chili use was 8 in the dyspepsia group (25–75% quartile ranges being 1.5–30) and 12 in the no-dyspepsia group (0–30). Corresponding figures for the number of units of chili used were 269 for the dyspepsia group (48–941.5) and 396 for the no-dyspepsia group (0–796). The differences between patients with and without dyspepsia in the frequency of chili use and in the amount of chili used were not statistically significant.

In the reproducibility study, the 28 subjects who were reinterviewed were found to give similar responses in the two interviews. The correlation coefficient for amount of chili intake in the two interviews was 0.67 and that for frequency of chili use was 0.96 by the Spearman test.

DISCUSSION

Chili causes dyspepsia in patients with and without ulcer, and ulcer patients are often advised to avoid its use (10). However, it has been shown not to cause macroscopic gastroduodenal mucosa injury (11, 12), although increased DNA loss and microbleeding suggest that some cellular damage may occur (13, 14). In duodenal ulcer patients taking antacids, healing rates were similar whether or not chili was included in the diet (15).

On the other hand, as earlier stated, there are reasons to suggest that chili use has a protective effect against peptic ulcer. Our results are consistent with this hypothesis. Compared to controls, ulcer patients have taken chili less frequently and in smaller amounts in the two years prior to presentation.

A dietary study such as ours can be subject to

several confounding factors. Approximately 20% of patients with peptic ulcer avoid chili use because chili tended to exacerbate dyspepsia (10). Another 15% avoided chili because they had been advised to do so by their medical attendants, their friends, or the lay press (10). In the present study, comparable proportions of subjects in the ulcer and control groups admitted to avoidance of chili for these reasons, and these patients were excluded. Our ulcer subjects used the same amount of chili whether or not they had dyspepsia. Therefore, the present findings cannot be explained by avoidance of chili due to symptom exacerbation.

There are several drawbacks to the present study. Only Chinese patients were studied, and it would take a much longer time period to collect enough Malay and Indian peptic ulcer patients for study. The interviewers were not blinded to the patient diagnoses. We have embarked on a larger case-control study in which these drawbacks will be overcome.

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