

# Age of onset of symptoms in duodenal and gastric ulcer

J Y Kang

## Abstract

The influence of the age of onset of symptoms on various clinical features of peptic ulcer was studied in a personal series of 492 patients (duodenal ulcer 363, gastric ulcer 98, combined gastric and duodenal ulcer 31). Duodenal ulcer patients whose age of onset of symptoms was within the first three decades ( $n=166$ ) were more likely to be men (77%) and to have a positive family history of dyspepsia (45%) and a history of haemorrhage (46%) when compared with late onset patients ( $n=197$ , men 57%, positive family history 23%, history of haemorrhage 36%). Early onset duodenal ulcer patients also secreted more gastric acid than late onset patients. In contrast, while early onset gastric ulcer patients were more likely to be men, when compared to late onset patients, the two groups were similar in their family history of dyspepsia, their history of haemorrhage, and their gastric acid output. The age of onset of Malay duodenal ulcer patients (mean (SD) 43.6 (16.0)) was higher than those for Chinese patients (33.7 (16.1)).

Many authors regard duodenal ulcer disease as a heterogeneous disorder<sup>1,2</sup> and studies on the age of onset of symptoms have provided evidence in favour of this view.<sup>2</sup> Both in Hong Kong and in Scotland duodenal ulcer patients whose symptoms began before age 30 differed from late onset patients in their sex distribution as well as in the frequency of a positive family history and a history of haemorrhage.<sup>3,4</sup> Jirasek<sup>5</sup> reported similar findings for a series of duodenal ulcer patients from Czechoslovakia. The study of peptic ulcer disease in Singapore is of particular interest because of differences in ulcer frequency seen in the three main racial groups,<sup>6,7</sup> the Chinese being more susceptible to ulcer disease than either Malays or Indians. The aims of the present study were, firstly, to determine whether the relation between onset of symptoms and clinical features occurred in duodenal ulcer patients in Singapore; secondly, to determine whether age of onset of symptoms in the various races of Singapore differed; and, thirdly, to determine whether age of onset symptoms influenced clinical features in gastric ulcer disease in the same way.

## Methods

### PATIENTS

All peptic ulcer patients including those with active ulcers, ulcer scars, or duodenal pseudo-diverticula treated by the author from January 1983 to December 1987 were studied. Those

who had undergone ulcer surgery other than simple oversewing of a perforated ulcer were excluded. The author was one of three gastroenterologists in a medical unit and patients were recruited through referral from the emergency department and from general practitioners. There was a separate surgical gastroenterological service which would have taken all patients presenting with perforation and some patients presenting with haemorrhage and dyspepsia. The following clinical features were examined in addition to demographic data: (i) ABO blood group; (ii) age of onset of dyspepsia, or in patients without dyspepsia, age of onset of complications; (iii) family history of dyspepsia: patients were asked about their first degree relatives with regard to dyspepsia and the occurrence of ulcer complications or ulcer surgery; a family history was deemed to be positive if any of the above was present; (iv) current or previous history of smoking; (v) history of upper gastrointestinal bleeding; it was assumed that any such bleeding was due to peptic ulcer. Because of the small numbers of patients reporting regular analgesic intake (4%) and previous perforation (1%), these features were not studied.

Gastric secretory testing was carried out on most patients using pentagastrin 6  $\mu\text{g}/\text{kg}$  body weight as the stimulant. We did not attempt to classify our patients into normosecretors and hypersecretors, as in Lam's study, since no satisfactory data are available for acid output in control subjects in our population.

### STATISTICAL ANALYSIS

Duodenal ulcer patients were divided into an 'early onset' group and a 'late onset' group, depending on whether the age of onset was below or above 30. The  $\chi^2$  test or Fisher's exact test (two tailed) were used to assess differences for categorical data, while the Wilcoxon rank sum test was used for assessment of numerical data. Since age 30 was obviously an arbitrary division, the relation between the age of onset and acid output was further studied using the Spearman correlation coefficient.

$p < 0.05$  was considered significant. Although multiple comparisons were performed regarding the clinical features of early and late onset duodenal ulcer patients, all these features have previously been studied and are therefore not being blindly compared for the first time.

## Results

A total of 492 patients were studied: 363 with duodenal ulcers, 98 with gastric ulcers, and 31 with combined gastric and duodenal ulcers, either concurrent or occurring at different times

Division of  
Gastroenterology,  
Department of Medicine,  
National University  
Hospital, Singapore 0511  
J Y Kang

Correspondence to:  
Associate Professor J Y Kang.  
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TABLE I Characteristics of early onset and late onset duodenal ulcer patients

	Early onset	Late onset	P value
No	166	197	
Sex (male:female)	128:38	113:84	0.0001
Blood group O (No (%))	78/143 (55)	92/169 (54)	0.93 NS
Smokers (No (%))	62/164 (38)	89/197 (45)	0.41 NS
Positive family history (No history (%))	69/155 (45)	42/186 (23)	0.0001
History of haemorrhage (No (%))	76/166 (46)	70/197 (36)	0.042
Basal acid output*	7.93	5.56	0.0001
Maximal acid output*	28.39	23.51	0.0001
Peak acid output*	32.98	27.97	0.0001

\*Expressed as mean mmol/h.  
NS = not significant.

over the follow up period. Diagnosis was made by endoscopy in all cases except one. This patient developed dyspepsia several days after an acute myocardial infarction and a corpus gastric ulcer was shown on barium meal. Endoscopy was performed by the author in 421 cases (86%).

Most patients (458/492, 93%) had active ulceration shown in our department at least once over the follow up period. In 15 patients with duodenal ulcer only pseudodiverticula were present, while in another 11 patients only duodenal scars were seen.

A family history was not obtained in 40 patients (8.1%) nor a smoking history in 4 (0.8%). Blood grouping was not performed for 69 patients (14.0%). Gastric secretory testing was not carried out in 86 patients (17.5%), while in a further two (0.4%) only the basal output was measured.

#### COMPARISON WITH OTHER PUBLISHED SERIES

Using age 30 as a dividing line, the relative proportions and clinical characteristics of early onset and late onset patients are shown in Table I. The two groups varied significantly in sex distribution, family history, history of haemorrhage, and in basal, maximal, and peak acid

TABLE II Early onset and late onset duodenal ulcer patients: clinical characteristics in three different series

	Hong Kong <sup>a</sup>	Scotland <sup>a</sup>	Singapore
Sex			
% males			
Early onset	81	81	77
Late onset	65	73	57
p value	<0.0025	<0.0025	<0.0001
Family history			
% positive			
Early onset	46	51	45
Late onset	19	29	23
p value	<0.0005	<0.0005	<0.0001
Blood group			
% group O			
Early onset	46	57	55
Late onset	61	63	54
p value	<0.001	NS	NS
Haemorrhage			
% with history			
Early onset	40	25	46
Late onset	21	17	36
p value	<0.001	<0.025	<0.05
Maximal acid output			
Early onset	44*	60*	28.4†
Late onset	30*	42*	23.5†
p value	<0.005	<0.0005	<0.0001

\*Expressed as % hypersecretors.

†Expressed as mean mmol/h maximal acid output.

output, but not in blood group O frequency or a history of smoking. Table II compares the present series with the Hong Kong and Scottish series reported by Lam.<sup>4</sup> With the exception of the blood group O frequency, all three series are similar.

In case age 30 was not the best dividing line between early and late onset patients, the age of onset was compared between blood group O patients *v* non-blood group O patients and between smokers *v* non-smokers. No significant differences were detected.

#### SEX AND AGE OF ONSET

Since men have higher acid outputs than women,<sup>5</sup> it is possible that the relation between age of onset and gastric acid output is secondary to the association between age onset and sex distribution. Correlation coefficients were therefore derived between gastric acid output and age of onset in men and women separately (Table III). All these correlations were statistically significant. The relation between age of onset, family history, and history of haemorrhage were similar in both sexes although with smaller numbers some of the comparisons lose statistical significance (Table III).

#### COMBINED GASTRIC AND DUODENAL ULCER

The 31 patients with combined gastric and duodenal ulcer could not be separately analysed. If they were, however, considered together with duodenal ulcer patients, 2/145 (1%) of early onset patients had an associated gastric ulcer compared to 27/169 (16%) of late onset patients ( $p > 0.001$ ). This compares with 2.3% of early onset patients and 7.1% of late onset patients having associated gastric ulceration in the series of Lam and Ong.<sup>3</sup>

#### EARLY AND LATE ONSET DUODENAL ULCER IN CHINESE, MALAYS, AND INDIANS

The proportions of early onset and late onset patients in the three main racial groups of Singapore are shown in Table IV. Proportionally, there were fewer Malay early onset duodenal ulcer patients (25%) compared to Chinese patients (48%), but this difference was not significant ( $p = 0.12$ ). The age of onset, however, in Malay patients was significantly greater than that for Chinese. Therefore, differences in duodenal ulcer frequency between Chinese and Malay were greater for patients with early onset disease compared to those whose ulcers developed later in life.

#### AGE OF ONSET FOR GASTRIC ULCERS (TABLES V AND VI)

There were 98 gastric ulcer patients in the present series. Their ages of onset tended to be higher than those of duodenal ulcer patients. Men presented at a younger age compared to women. In contrast to duodenal ulcer patients, however, none of the other clinical characteristics studied was correlated with the age of onset of symptoms.

TABLE III The effect of sex on the relation between age of onset and various clinical features in duodenal ulcer patients

	Men	Women	Both sexes
Age of onset (mean, year)	31.7	40.4	34.9
Basal acid output* (p value v age of onset)	7.16	5.59	6.62
Maximal acid output* (p value v age of onset)	0.004	0.027	0.0003
Peak acid output* (p value v age of onset)	32.55	25.10	30.16
Family history % positive early onset v late onset	47 v 19	38 v 26	†
p	0.0001	NS	
Haemorrhage % early onset v late onset	47 v 38	42 v 30	†
p	NS	NS	
Blood group O % early onset	56 v 54	51 v 55	†
Smoking % early onset v late onset	46 v 57	11 v 28	†
p	NS	<0.05	

\*Expressed as mean mmol/h.

†Data give in Table I.

NS=not significant.

Of the 98 patients, 83 had corpus ulcers and 15 had prepyloric ulceration. Because of small numbers the two groups could not be separately analysed.

### Discussion

It has been suggested that duodenal ulcer disease is a heterogeneous disorder – not one disease but a number of diseases with a common expression.<sup>1,2</sup> Support for this view had emerged from studies of the onset of symptoms. Two series of duodenal ulcer patients from Hong Kong indicated that patients whose symptoms began before age 20 or 30 differed from those whose symptoms began later in several respects. Early onset patients were more likely to be men, to have a family history of dyspepsia or a history of gastrointestinal bleeding, and to be acid hypersecretors compared to late onset patients. Late onset patients, but not the early onset group, had an increased prevalence of blood group O compared to the general population.<sup>3,4</sup> A parallel series of patients from Scotland could be similarly divided into early onset and late onset groups. In contrast to the Hong Kong patients, however, the Scottish early and late onset patients did not differ with respect to blood group O prevalence.<sup>4</sup> In another study from Czechoslovakia,<sup>5</sup> early onset duodenal ulcer patients were also more likely to be men and to have positive family histories compared to late onset patients. These series of patients were

TABLE IV Age of onset (years) in duodenal ulcer patients of different races

	Chinese	Malays	Indians
Mean (SD) of onset (years)	33.7 (16.1)	43.6 (16.0)	38.4 (16.5)
Median	30	47	34.5
Range	6–80	18–63	17–74
No (%) with onset before age 30	151/317 (48)	3/12 (25)	12/33 (37)

Age of onset of Chinese v Malays:  $p < 0.05$ .

TABLE V Characteristics of onset and late onset gastric ulcer patients

	Early onset	Late onset	P value
No	16	82	
Sex (male:female)	15:1	52:30	0.017
Blood group O (No (%))	4/13 (31)	31/71 (45)	NS
Smokers (No (%))	8/16 (50)	36/81 (44)	NS
Positive family history (No (%))	1/12 (8)	11/72 (15)	NS
History of haemorrhage (No (%))	4/16 (25)	34/82 (41)	NS
Basal acid output*	3.97	3.53	NS
Maximal acid output*	18.24	17.01	NS
Peak acid output*	22.32	19.00	NS

\*Expressed as mean mmol/h.

NS=not significant.

recruited in different ways, the Hong Kong and Scottish series from combined medical-surgical units; the patients in the Czechoslovak study were selected to an extent by the age of onset of disease, while the present series comprised patients presenting to a medical gastroenterologist. Similar characteristics of early and late onset duodenal ulcer in different patient populations, however, suggest similar underlying pathophysiological mechanisms.<sup>2</sup>

Among our duodenal ulcer patients, the age of onset of symptoms is similarly related to sex ratio, family history, history of haemorrhage, and gastric acid secretion. These relations apply to patients of both sexes. Our early and late onset patients therefore behave in the same way as patients in Hong Kong, Scotland, and Czechoslovakia. The age of onset of symptoms, therefore, seems to be a marker for two subsets of patients. The differences in gastric acid output between early- and late-onset duodenal ulcer patients were small, however, and probably not clinically relevant.

In another British series,<sup>9</sup> older peptic ulcer patients presented with bleeding more often than younger patients. We did not find any relation between age and history of haemorrhage in women with gastric or duodenal ulcer or in men with gastric ulcer. Men with duodenal ulcer who bled were slightly younger than those who did not bleed (mean SD) 38 (16) years v 43 (16),  $p < 0.05$ .

The study of peptic ulcer epidemiology in Singapore is of particular interest because of differences in ulcer frequency in the three main racial groups. The reasons for these racial differences are unknown but environmental influences probably play a part, since the Chinese:Malay

TABLE VI Correlation between age of onset and various clinical characteristics in gastric ulcer

	Mean age of onset		p value
	Characteristic present	Characteristic absent	
Sex (male)	44.5	55.7	0.002
Blood group O	47.1	47.5	NS
Smoking	46.6	48.0	NS
Family history	44.8	48.5	NS
History of haemorrhage	49.5	47.1	NS

NS=not significant.

difference has diminished over the past three decades.<sup>6</sup> The onset age of duodenal ulcer was lower for Chinese compared to Malays. Therefore, racial differences in the factors predisposing to duodenal ulcer may diminish with age.

The age of onset of symptoms in gastric ulcer disease has not, to our knowledge, been studied before. While the age of symptoms was related to the sex ratio, there was no association with gastric acid secretion, the frequency of haemorrhage, or a positive family history. This is therefore different from the situation in duodenal ulcer. The relation between gastric ulcer and duodenal ulcer remains a matter for debate. One view is that gastric ulcer and duodenal ulcer are different diseases.<sup>10</sup> Another view is that the two conditions are different expressions of the same disease process, genetic and epidemiological factors determining whether the mucosal ulceration should occur on the gastric or the duodenal side.<sup>11</sup> Our results tend to support the former view.

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