

# THE EPIDEMIOLOGY OF PEPTIC ULCER IN SINGAPORE: A REVIEW

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## SYNOPSIS

No epidemiological study of peptic ulcer in Singapore has been conducted although this has been done, using different methods, in most of the Western countries. However, there have been a number of publications relating experiences on different aspects of peptic ulcer as seen in Singapore and Malaysia. These are mainly clinical studies. It has been thought worthwhile to correlate the data in order to draw attention to salient features.

There were 55 deaths certified due to peptic ulcer in 1966 and 97 in 1968, the increase being greater from duodenal than for gastric ulcer. A further indication of prevalence is the report by Chua and Seah (1969) of 730 cases of peptic ulcer seen over an eight-year period at Thomson Road General Hospital, about one in every 25 admissions.

The changing incidence of duodenal ulcer as compared to gastric ulcer is interesting. Surgical experience by Yeoh (1961) showed a DU : GU ratio of 1.6 to 1 whilst Ong and his colleagues (1965, 1967 and 1968) found a slight excess of gastric rather than duodenal ulcers. The latter were writing about patients selected for surgery because of haematemesis which might have biased the results. From a medical experience, Chua and Seah (1972) reported a DU : GU ratio of 2.7 to 1, with an incidence of haematemesis and melaena of 47%, a figure much higher than in other places. These changes are unexplained.

All writers have emphasized that duodenal ulcer occurs in younger patients than gastric ulcer and that the latter has a higher rate of complications.

Another important epidemiological finding has been an increased frequency of peptic ulcer in Chinese compared to the other races.

Although there is evidence to suggest an increasing prevalence and changing pattern of peptic ulcer, with high morbidity, there has been no systematic enquiry. A plea is made for this to be undertaken to seek the possible answers to questions raised in this review.

Epidemiology of peptic ulcer is concerned with the incidence and prevalence of peptic ulcer in different but comparable populations, or in the same population at different times, and in both cases with the different types of ulcer and their distribution in terms of age, sex and other variables within each group studied.

There have been many publications in what is obviously a large and complex subject. The early work was reviewed fully and critically by Ivy *et al* (1951). They concluded that most studies made before that date must be regarded as incomplete or unreliable. In some, this was because the number

of cases was too small for statistical significance or they were not representative of the population at risk. In others diagnostic criteria were either not stated or were unacceptable, or the published data lacked essential information such as the age or sex of the patients studied.

The methodology of any survey of peptic ulcer also presents problems. Ideally, a prevalence study should include all cases. In a disease such as peptic ulcer, which may be without symptoms, this can be done only from autopsy figures. However, Ivy and his group (1951) state that even these "can be grossly misleading".

There are other limitations to clinical studies. Many include only patients admitted to hospital, or diagnosed by some particular technique such as radiology or gastroscopy, or with some complication requiring surgery, such as perforation or massive haematemesis. In such instances, the population studied is limited by the method of selection, and may not be representative of the population at risk. Nevertheless, such clinical studies are an essential part of the total picture of peptic ulcer in

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a community. They may reveal such essential facts as which type of ulcer or ulcer patient is more or less liable to specific complications or death. This has direct value in decisions concerning prognosis and therapy in any individual case.

A further method is to find the prevalence of diagnosable, or symptomatic, peptic ulcer in a community. This has been attempted by many workers, the most important study being that of Doll and Avery Jones (1951) in the United Kingdom. Their report includes discussions of earlier work and of the general problems of peptic ulcer surveys. Such a study can provide information rapidly and cheaply, since the initial screening of the target population for dyspeptic symptoms can be done by para-medical workers. The disadvantages are that asymptomatic lesions are not included, and that little distinction is possible between gastric and duodenal ulcers, although the evidence favours their being different diseases. These defects can be overcome to some extent by extrapolation from clinical and pathological data. Any effective study of the epidemiology of peptic ulcer therefore requires multiple methods of ascertainment.

In the past, such studies, though largely restricted to European and North American populations, have led to some general conclusions:

- (i) There are large differences in ulcer prevalence between different populations (Ivy *et al*, 1951).
- (ii) Within a community, ulcer prevalence varies with age and sex. All peptic ulcers are rare in children. In general duodenal ulcer is relatively more frequent in males, and gastric ulcer in females.
- (iii) In each group that has been studied serially, ulcer prevalence rates have varied with time, both in the number and types of ulcer present, and also in the sub-groups of each society with higher or lower prevalence rates.

This has been documented in the United Kingdom by Watkinson (1960) and in Australia by Billington (1965).

These changes do not follow a similar direction in all instances.

- (iv) Peptic ulcer rates are affected by urbanisation and some occupations (Doll and Avery Jones, 1951). In most studies peptic ulcers have been relatively frequent in medical officers, and relatively infrequent in agricultural workers.
- (v) There is reasonable evidence favouring a genetic factor in peptic ulcer, probably

with separate inheritance of gastric and duodenal ulcers (Doll and Buch, 1950).

- (vi) There is some evidence that this genetic influence extends to produce different prevalence rates in different races.

These generalisations suggest the need for further study of the epidemiology of peptic ulcer, especially in non-European societies, and in societies undergoing progressive development and urbanisation.

Singapore offers an outstanding opportunity for such work. It is geographically compact, with a multi-racial society, an effective civil service and an accurate population census. Medical care is of a high standard, and the majority of the population use the facilities of a centralised hospital service. The requirements for epidemiological work are thus already present.

There is evidence that peptic ulcer is sufficiently frequent in Singapore to make a prevalence study possible with comparatively small numbers of subjects. There were 55 deaths certified due to peptic ulcer in 1966, and 97 in 1968, giving death rates per 100,000 population of 2.87 and 4.88 respectively (Arumainathan *et al*, 1968). The increase was relatively greater for duodenal than for gastric ulcer. Admissions to Outram Road General Hospital in 1969 included 1,193 patients with peptic ulcer, while Chua and Seah (1969) reported 730 cases of peptic ulcer seen over an eight-year period at Thomson Road General Hospital, about 1 in every 25 admissions.

There has been increasing clinical study of peptic ulcer in Singapore. In early papers, no figures were available from local experience (Hutter, 1953; Monteiro, 1953), but this has to some extent been remedied in recent years.

In 1961 Yeoh (1961) reported 700 patients with peptic ulcer treated in a surgical unit between 1949 and 1960. There were more duodenal than gastric ulcers, the GU:DU ratio being 1:1.6. Duodenal ulcers also occurred at a slightly younger age with the peak incidence early in the fifth decade, compared to the sixth decade for gastric ulcer. Both types of ulcer were relatively more prevalent in Chinese than in other races.

Further papers were published by Ong and his colleagues (Ong *et al*, 1965; Ong, 1967; Ong and Yong, 1968). Their findings differed from those of Yeoh (1961). They found an excess of gastric rather than duodenal ulcers, the GU:DU ratio being 1 : 0.8. These patients were selected for surgery because of haematemesis. This may have biased the figures, since in a series of 718 patients admitted to a medical unit with haematemesis, Chua and Seah (1972) reported a GU : DU ratio

of 1 : 2.7. Similarly, in 730 patients with peptic ulcer requiring admission to hospital, the GU : DU ratio was 1 : 2.3 (Chua and Seah, 1969). These latter authors also found an incidence of haematemesis and melaena of 47%. This is much higher than in series from other places, where the incidence of gastrointestinal bleeding is usually below 25% (Ivy *et al.*, 1951; Illingworth, 1953).

All writers from Singapore emphasised that duodenal ulcer occurs in younger patients than gastric ulcer, and that the latter has a higher rate of complications requiring surgical intervention.

Other clinical studies include papers on methods of investigation of patients with peptic ulcer, such as gastroscopy (Fung, 1968, 1970a ; Chua, 1969).

An epidemiological finding of great interest in these reports has been an increased frequency of peptic ulcer in Chinese compared to Malays, Indians and Pakistanis, relative both to their numbers in the population and to the numbers of hospital admissions of each group. Within the Chinese, Yeoh (1961) found some evidence that Cantonese women were more susceptible to peptic ulcer than women from other parts of China. This has not been investigated further.

Differences in ulcer prevalence between different races living in the same area have been noted in other countries, including those adjacent to Singapore.

The most important early study was that of Kouwenaar (1930) in Sumatra. He examined at autopsy over 3,000 subjects, including 1,370 Chinese and 1,668 Javanese, looking especially for active peptic ulcer or peptic ulcer scars. He found a prevalence of 11% in Chinese and 0.6% in Javanese, a highly significant difference. There was a suggestion that the rate in Indians was intermediate between these groups, although the numbers were small. Kouwenaar also found the occurrence of both types of ulcer increased with age, and, in striking contrast to the recent Singapore figures, there was an excess of gastric ulcers, the GU : DU ratio being 1 : 0.47.

In Malaysia, also, Alhady (1965) reported that peptic ulceration requiring admission to hospital had a lower incidence in Malays than in Chinese and Indians. He did not differentiate between different types of peptic ulcer. There are also differences in ulcer prevalence between different groups in India itself (Malhutua, 1968), and between Indians and Africans (Kark, 1965).

There have been many attempts to explain such findings. None is satisfactory, Kouwenaar (1930) could not relate his results to diet, occupation, tobacco or opium smoking, or any other identifiable factor. More recent workers have examined

gastric acid production in different groups, but without finding significant differences between European, Indian, Chinese and Malay subjects (Vakil and Mulekar, 1965; Alhady and Kandiah, 1967). This may apply also to plasma pepsinogen levels (Alhady, 1968). However, the numbers involved are small, and Fung (1967, 1970b) has produced evidence that sensitivity to histamine may vary in different races. A further study using synthetic gastrin is needed.

More generally, knowledge of gastric structure and function of this type is extremely small. Only recently has atrophic gastritis with pernicious anaemia been described in Asians in Singapore (Jayaratnam *et al.*, 1967). The frequency of gastric lesions other than peptic ulcer is unknown. Nor has there been systematic study of blood frequencies in relation to peptic ulcer in this area, although these frequencies are known to differ between different races (Mourant, 1954).

## DISCUSSION

This survey of the epidemiology of peptic ulcer in Singapore serves mainly to document our scarcity of knowledge of a disease with a high morbidity and increasing mortality.

Despite this, published data suggest that there are highly significant differences in the prevalence of peptic ulcers requiring admission to hospital in different races in Singapore. It is not known whether this applies also to all peptic ulcers or to all symptomatic peptic ulcers, as well as those requiring hospital admission. These differences may be due to unidentified genetic factors, to environmental factors such as differing diets or modes of life, or a combination of both.

There is also evidence that peptic ulcers are increasing in frequency in Singapore, and that this is accompanied by a change from a preponderance of gastric ulcers to a preponderance of duodenal ulcers. But it is not known whether the former is decreasing, or the latter increasing in incidence, or both. Nor is there knowledge as to whether this alteration in the prevalence ratio of the two is due to an alteration in the natural history, the duration of the disease, in one or both types of peptic ulcer. Figures for the occurrence of ulcer complications in Singapore differ widely from those in some other countries. Since gastric ulcer appears to have a higher morbidity and mortality than duodenal ulcer, such information would be of value in planning health services.

More generally, if there is an increasing prevalence of peptic ulcer related to urbanisation and industrial and economic progress, then the changes

in epidemiology seen now in Singapore, may be expected to follow elsewhere in Southeast Asia as industrial development takes place.

A major study of peptic ulcer in Singapore is therefore not only technically possible, but of value also to Southeast Asia as a whole, and could make a valuable contribution to world knowledge of a common, important, but ill-understood disease.

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