Epidemiology of peptic ulcer disease

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INTRODUCTION

The epidemiology of both gastric and duodenal ulcer is characterized by marked geographic and temporal variations. The incidence, prevalence and mortality of gastric and duodenal ulcer vary four- to ten-fold among different European countries. During the past 20–30 years the number of patients who died from peptic ulcer disease, who have been operated upon, who saw physicians or were hospitalized for peptic ulcer disease have decreased by more than 100 per cent. These changes occurred within so short a period that a genetic basis can be ruled out. Thus, it seems likely that they stem from changes in environmental risk factors. The geographic variability of ulcer prevalence among populations of similar ethnicity and comparable medical standards also hints at environmental influences. Judging from their effect, it appears that environmental factors are of sufficient magnitude to constitute a fertile ground for inquiry because such information would engender the development of potent measures for prevention and treatment of gastric and duodenal ulcer disease. In addition, knowledge of environmental risk factors could provide new insights and methods to study the pathophysiology of peptic ulcer.

Four environmental risk factors have been shown to contribute to the epidemiology of gastric and duodenal ulcer: smoking; chronic intake of aspirin and other non-steroidal anti-inflammatory drugs; occupational workload; and salt consumption. Although all four risk factors influence the occurrence of ulcer disease in individual patients, only the variations in occupational workload...
and dietary salt intake have shaped the geographic and temporal characteristics of ulcer disease. The first two sections of the present chapter deal with the geographic and temporal variations in the occurrence of peptic ulcer disease. Its prevalence is high in industrialized countries and low among Third World countries, respectively. The geographic pattern is similar in age groups ranging from 15 years onward suggesting that the exposure to the environmental agents starts around the age of 15 years. The temporal variations, on the other hand, show that the risk of developing peptic ulcer disease was highest among those generations born at the turn of the century and that the risk declined for all consecutive generations. These changes occurred in different countries alike. In the subsequent sections, it is investigated which environmental risk factors display temporal and geographic distributions that match those of ulcer disease. Only the variations in workload and salt consumption are shown to run parallel to those of ulcer disease. In the final section, it is shown how knowledge about exogenous risk factors may lead to a better understanding of the natural history of peptic ulcer disease.

GEOGRAPHIC VARIATION

Mortality from gastric ulcer disease varies four-fold among different countries. The highest mortality occurs in Japan and Portugal, the lowest one in Canada and the United States (Table 1.1). Studies dealing with the incidence of gastric ulcer show a geographic pattern similar to that of mortality\textsuperscript{12-16}. Mortality from duodenal ulcer is high in Scotland, England, Italy, and Portugal and low in Belgium and France. Again, the geographic variation in mortality is confirmed by studies dealing with the incidence of duodenal ulcer\textsuperscript{12-16}. Both ulcer types are rare in Third World countries\textsuperscript{17,18}.

The same type of geographic variation of ulcer mortality applies to different age groups. For instance, mortality from gastric ulcer is high in all Japanese age groups, while it is low in all U.S. age groups. The ratio of ulcer mortality from two different countries remains the same for any two age groups compared. Hence, when the death rates of consecutive age groups from different countries are plotted versus one another, significant linear relationships emerge\textsuperscript{19} (Figure 1.1). The age-specific death rates from different countries were standardized according to the method of indirect standardization for purposes of comparison\textsuperscript{20,21}. (The standardized mortality ratio (SMR) of each country corresponds to the ratio of the observed over the expected number of deaths during the periods 1921–1980 or 1951–1980: SMR = Observed/Expected. The expected number of deaths in each individual country was calculated from the average age-specific death rates ($\bar{r}$) of all countries applied to the population of the individual country: Expected = $\bar{r} \times$ Population.) In Figure 1.1, the SMR of the age group 0–4 years was plotted versus the