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Update: Acute Coronary Syndromes (I)

The Epidemiology of Coronary Heart Disease

Ignacio Ferreira-González*

Unidad de Epidemiología, Servicio de Cardiología, Hospital Vall d'Hebron y CIBER de Epidemiología y Salud Pública (CIBERESP), Barcelona, Spain

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ABSTRACT

Understanding the societal impact and trends of coronary heart disease through basic epidemiological measures is essential to evaluate treatment effectiveness and organize resource distribution. In the following narrative review, data are presented on the prevalence, incidence, and prognosis of coronary heart disease in general and of acute coronary syndrome in particular.

Epidemiología de la enfermedad coronaria

Palabras clave:
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Prevalencia
Incidencia
Pronóstico

RESUMEN

Conocer el impacto de la enfermedad coronaria en la sociedad a través de las medidas epidemiológicas básicas y su evolución es fundamental para evaluar la efectividad de los tratamientos y organizar la distribución de recursos. En la siguiente revisión narrativa, se presentan datos sobre prevalencia, incidencia y pronóstico de la enfermedad coronaria en general y del síndrome coronario agudo en particular.

INTRODUCTION

Although the mortality rate from ischemic heart disease has decreased in the last 4 decades in developed countries, it continues to cause approximately one third of all deaths in persons older than 35 years of age.[1] It has been estimated that almost half of middle-aged men and one third of middle-aged women in the United States will have some symptoms of ischemic heart disease.[2] Meanwhile, cardiovascular disease causes an estimated annual total of 4 million deaths in Europe and of 1.9 million deaths in the European Union, largely due to coronary heart disease (CHD),[3] representing 47% and 40% of all deaths in Europe and the European Union, respectively. In Europe, cardiovascular disease leads to a total estimated annual cost of 196 billion euros of which approximately 54% is due to direct health care costs and 24% is due to lost productivity. Moreover, the effects of CHD are not limited to developed countries. As discussed below, recent data indicate that the impact of this disease is increasing in non-Western countries.

The present narrative review of the epidemiology of CHD discusses data on the trends in the prevalence (number of existing cases in a population) and incidence (number of new cases during a specific time) of CHD, with both values used as epidemiological measures of the impact of a disease on a population. Also presented is the information believed to be most relevant to trends in CHD prognosis.

Most information on coronary morbidity and mortality is drawn from data provided by national surveys and observational cohort studies. Although these types of studies are useful, they should be interpreted with caution because they are uncontrolled, with no verification of the accuracy of participant-reported information. Generalization of findings to other periods different from that of the study can also be dangerous and comparisons among studies should be critically interpreted due to possible methodological differences. In this regard, the universal definition of myocardial infarction[4] has presented a challenge to the interpretation of measures of the impact of CHD before and after the adoption of the definition in 2000.

Finally, there is considerable variability between studies and official statistics in the terminology, definitions, and condition selected when assessing the impact of CHD in a population. Whereas some statistics refer generically to "ischemic heart disease", others concentrate on acute myocardial infarction or on acute coronary syndrome (ACS) with or without ST-segment elevation. The following discussion primarily addresses the epidemiology of CHD in general and, where indicated, details specific cases of acute myocardial infarction and ACS.

PREVALENCE

Estimation of the true prevalence of CHD in the population is complex. This estimation is often performed via population surveys. Recently, the official statistics office of the American Heart Association published information obtained using this methodology. In particular, the survey estimated that about 15.4 million persons older than 20 years in the United States have ischemic heart disease.[5] This figure corresponds to an overall

* Corresponding author: Unidad de Epidemiología, Servicio de Cardiología, Hospital Vall d'Hebron, Pg. Vall d'Hebron 119-129, 08005 Barcelona, Spain.
E-mail address: nacho@ferreiragonzalez.com

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Abbreviations

ACS: acute coronary syndrome
CHD: coronary heart disease

prevalence of CHD among those older than 20 years of 6.4% (7.9% in men and 5.1% in women). For myocardial infarction, the prevalence rate was estimated to be 2.9% (4.2% in men and 2.1% in women).

Although the prevalence of CHD increases with age in both men and women, another survey-based American study showed some variation in recent decades in the male:female prevalence ratio in middle-aged persons (35-54 years). Thus, although the prevalence was higher in men than in women in both 1994 to 1998 and 1999 to 2004, this period showed a trend toward a decrease in prevalence in men and an increase in prevalence in women (2.5 vs 0.7 in 1994-1998 and 2.2 vs 1.0 in 1999-2004).[6] The most recent data continue to show a strong male predominance in CHD in general and in myocardial infarction in particular in all age groups (Figure 1).[5]

No data are available on the true prevalence of CHD in Spain. Only 1 study from more than a decade ago has directly analyzed the prevalence of angina in the general population, finding rates of 7.3% in men and 7.7% in women.[7] However, an indirect approximation can be made via data from the population survey of the Spanish National Institute of Statistics (*Instituto Nacional de Estadística*). In this survey, participants were periodically asked about "chronic or long-term diseases experienced in the last 12 months". In the last 2 surveys, explicit reference was made to myocardial infarction, and levels much lower than those of the American population[8] were estimated for each age group (Figure 2). Although this survey is obviously vulnerable to the usual biases, because the methodology is similar to that used in other countries, it is not necessary *a priori* to discard the data when making comparisons with other regions. Moreover, although prevalence is only an indirect approximation, it is valid when analyzing the time course. Thus, a marked decrease can be seen in all age groups in the rate of positive responses to the question on myocardial infarction from the 2006 to the 2012 surveys (Figure 3).

To correctly interpret the above findings, it is necessary to bear in mind that the data obtained from population surveys could underestimate the true prevalence of ischemic heart disease. This

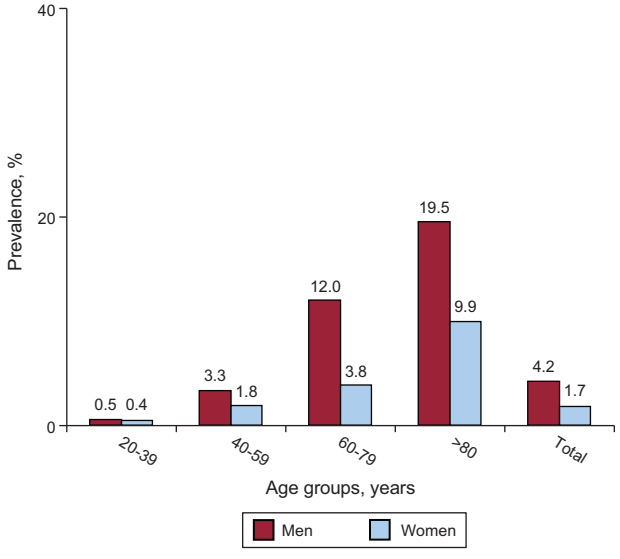

Figure 1. Prevalence of myocardial infarction by age group in the United States (2007-2010).

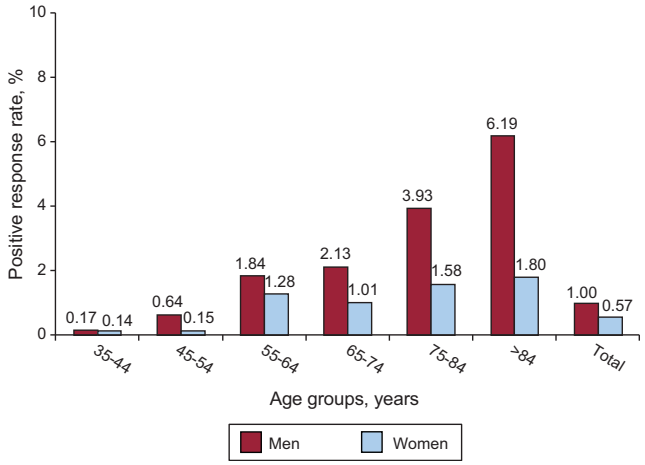

Figure 2. Rate of positive responses, by age group, to the question on "history of myocardial infarction in the last 12 months" in the population survey of the Spanish National Institute of Statistics (2011-2012).

underestimation is because ischemic heart disease is often clinically silent or causes few symptoms, even in advanced stages of coronary disease, with silent ischemia estimated to occur in up to 75% of all ischemic episodes.[9]

INCIDENCE

The incidence rate, defined as the number of new cases of a disease in a specific population and time period, is usually estimated via cohort studies, specific registries, or official statistics, such as discharge record data. Perhaps the study that has provided the most information on the natural history of CHD and, accordingly, its incidence is the Framingham Study. Data from the 44 years of follow-up of the original Framingham Study cohort and the 20 years of follow-up of the offspring of the original cohort have yielded various demographic observations,[10–12] particularly the influence of sex and age on the incidence of CHD, which can conceptually be extrapolated to the majority of the population and to the current period.

For example, it is known from the Framingham cohort that the incidence of coronary events rapidly increases with age and that women have rates that are similar to those of men 10 years younger (a mean "delay" of 10 years in the incidence rates). In the case of myocardial infarction and sudden death, the delay in

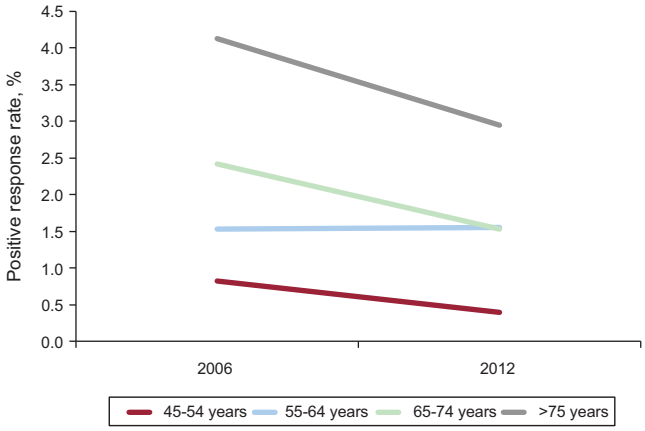

Figure 3. Difference between 2006 and 2012 in the rates of positive responses, by age group, to the question on "history of myocardial infarction in the last 12 months" in the population surveys of the Spanish National Institute of Statistics.