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Adverse Consequences of the 50% Misconception

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Abstract

It is often claimed that only 50% of the incidence of coronary heart disease in the population can be attributed to the standard major risk factors. A careful review of the literature demonstrates that 75–90% of coronary heart disease incidence within a variety of populations is explained by the standard modifiable risk factors. In conclusion, these data suggest that a more rigorous focus on these conventional risk factors and the lifestyle behaviors that promote them has great potential to reduce the burden of coronary heart disease worldwide.

Introduction

Coronary disease remains the leading cause of death and disability in the developed countries despite declines in incidence and mortality driven by lifestyle changes and medical amelioration of the major risk factors. This has stimulated a vigorous search for other correctable risk factors, encouraged by the claim that only 50% of the incidence of coronary heart disease in the population can be attributed to the standard major risk factors.^{1–3}

Origin of the 50% myth

An examination of the sources for the claim that only half the coronary heart disease (CHD) incidence is accounted for by the standard established risk factors indicates that it is not supported by plausible or experiential data. One possible early source for the unsubstantiated claim may have been misinterpretation of data in a report from the National Heart Lung and Blood Institute comparing differences in coronary heart disease incidence in Framingham, Honolulu, and Puerto Rico.⁴ Vital statistics at that time (1974) indicated a lower CHD death rate in middle-aged men in Puerto Rico and Honolulu compared to Framingham. To investigate this finding, the National Heart Lung and Blood Institute initiated prospective studies in these other locations in 1965. An attempt was made to determine if the CHD differences observed are explained by differences in a small set of uniformly measured risk factors in the 3 population samples. It was observed that the average Honolulu Japanese and Puerto Rican man had a 50% lower CHD incidence than his counterpart in Framingham. Even after allowing for differences in population characteristics (smoking, cholesterol and blood pressure), the difference was statistically significant and about 2:1 in magnitude (Figure 1). Major risk factors such as high density lipoprotein-cholesterol and diabetes

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mellitus could not be included in this investigation, and this study looked for an explanation for differences in CHD rates *among*, but not *within* populations.

This poor performance of risk factor prevalence differences in explaining variations in CHD mortality rates among different population samples has been noted elsewhere.⁵ This may be fostered by a greater variation of risk factors within countries than among them, and the length of time the risk factors have been at their current levels. However, another study of 17 countries claimed that the variation in average serum cholesterol levels across them appeared to explain 80% of the variation in their CHD mortality rates.⁶

Another evidence cited for the claim that current risk factors do not account for more than half the CHD occurrence is the continued residual risk of CHD after control of multiple risk factors in patients or populations. This argument discounts the long-term damage imposed by the prior exposure to the risk factors. No risk factor treatment strategy has been shown to restore damaged arteries to a normal pristine state.

Data contradicting the 50% misconception

Although widely asserted,¹⁻³ the belief that more than 50% of patients with CHD lack conventional risk factors is not supported by key data. Nor is the related assertion that the conventional risk factors explain less than 50% of the incidence of CHD. Many have challenged the assertion that more than 50% of patients with CHD lack any of 4 conventional risk factors (cigarette smoking, diabetes, hyperlipidemia, and hypertension). For example, Umesh et al determined the prevalence of the 4 conventional risk factors among 122,458 patients with CHD enrolled in 14 international randomized clinical trials of CHD conducted during the prior decade.⁷ Among patients with CHD, at least 1 of the 4 conventional risk factors was present in 84.6% of women and 80.6% of men. In younger patients (men < 55 years and women < 65 years) and in most patients presenting either with unstable angina or for percutaneous coronary interventions, only 10% to 15% of patients lacked any of the 4 conventional risk factors. This pattern was largely independent of sex, geographic region, trial entry criteria, or prior CHD.

Magnus and Beaglehole in 2001 pointed out the faulty interpretation of the data cited to support this claim.⁸ Nevertheless, the assertion continues to be made despite the evidence that as much as 75–92% of the CHD in the population may be attributable to the major established CHD risk factors. Observational studies show that lack of hypertension, hyperlipidemia, and cigarette smoking was associated with a 77% to 92% reduction in cardiovascular mortality, findings similar to other studies.^{9,10} In essence, patients without any of the conventional risk factors are unlikely to develop CHD.

The claim that only 50% of CHD incidence is explained by traditional risk factors implies that other factors identified and unidentified are likely to play a significant role in promotion and prevention of CHD. This has led to considerable interest in novel risk factors and genetic causes of CHD. Much attention has recently been directed at identification of genetic factors influencing development of CHD. Although genetic differences may influence an individual's reaction to or the burden of his or her conventional risk factors, it is unlikely that the population prevalence of CHD is mainly explained by genetic factors alone. Epidemiological studies convincingly indicate that CHD incidence in various populations is largely dependent on the prevalence of conventional risk factors, their interactions with genetic factors, behaviors that promote them, and environmental factors. Furthermore, CHD prevalence changes substantially as behaviors and environmental conditions change over short periods, as was observed in Japanese migration studies¹¹ and in country-specific data from the World Health Organization.¹² Even a strong family history of CHD, usually believed to be chiefly due to a shared genetic predisposition, to a large extent represents a

shared exposure to a higher prevalence of conventional risk factors.¹³ Furthermore, the Framingham study has shown that while there is an independent contribution of a family history to CVD to its occurrence in offspring at any level of multivariable risk, the CVD risk varies over a wide range depending on the burden of associated conventional risk factors.¹⁴ All of these data emphasize the crucial importance of environmental influences and conventional risk factors in the development of CHD, even in populations with similar genetic profiles.

Although research on non-traditional risk factors and genetic causes of heart disease is important, clinical medicine, public health policies and research efforts should continue to emphasize controlling the conventional modifiable risk factors and the behaviors causing them. The conventional risk factors and the cardiovascular risks they impose are to a great extent preventable by a healthy lifestyle.¹⁵ Also, abundant evidence already exists that controlling the traditional risk factors confers a benefit. The novel risk factors have not yet achieved that status.

Conclusions

Although widely asserted, the belief that more than 50% of patients with cardiovascular disease lack conventional risk factors is not supported by key data which suggest that 75–90% of the disease incidence within a variety of populations is explained by the standard modifiable risk factors. The claim that the established risk factors only explain 50% of the CHD incidence within a population is unfortunate because it implies that even if the major risk factors are fully controlled we could only at best reduce the incidence only by half. A more rigorous focus on the 4 conventional risk factors and the lifestyle behaviors that cause them has great potential to decrease the worldwide adverse health impact of CHD.

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Probability of CHD at average Specified Levels of Risk Factors

Gordon T, et al. J Chronic Dis 1974; 27:329-344

Figure 1.
Probability of CHD at Levels of Specified Risk Factors: Framingham, Honolulu, and Puerto Rico.