

American Journal of Cardiology 34: 29-34. (July 1974).

Role of Diabetes in Congestive Heart Failure: The Framingham Study

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The incidence of congestive heart failure was determined in relation to prior diabetic status in 5,209 men and women aged 30 to 62 years followed up for 18 years in the Framingham study. Men aged 45 to 74 years had more than twice the frequency of congestive failure as their nondiabetic cohorts, and diabetic women had a fivefold increased risk. This excessive risk appears to be caused by factors other than accelerated atherogenesis and coronary heart disease. Even when patients with prior coronary or rheumatic heart disease were excluded, the diabetic subjects had a four- to fivefold increased risk of congestive heart failure. In women (but not men) with prior coronary disease, diabetes also imposed a threefold increased risk of congestive failure. Furthermore, the increased risk of heart failure in the diabetic patients persisted after taking into account age, blood pressure, weight and cholesterol values as well as coronary heart disease. Women with diabetes appeared to be especially vulnerable and, irrespective of coronary disease status, had twice the frequency of congestive heart failure as men. The excessive risk of heart failure among diabetic subjects was confined to those treated with insulin. The data suggest that diabetes is another discrete cause of congestive heart failure and that some form of cardiomyopathy is associated with diabetes, as a result of either small vessel disease or metabolic disorders.

Congestive heart failure is a common end stage of heart disease due to a variety of causes. The incidence is far from trivial. The annual rate is 2.3/1,000 men and 1.4/1,000 women aged 30 years and over.¹ Despite the availability of potent glycosides and diuretic agents, congestive heart failure continues to be a lethal process, and half of the patients die within 5 years of onset.¹ Previous study¹ revealed that hypertension and coronary heart disease were the dominant causes, but 14 percent of men and 26 percent of women with congestive failure also had diabetes, an apparent excess. The purpose of this report is to explore the role of diabetes in the development of congestive heart failure and to assess its contribution taking into account the presence of coronary heart disease and atherogenic factors such as hypertension, high serum cholesterol levels, overweight and increased age.

Methods

The Framingham study was initiated in 1949 to explore the epidemiology of cardiovascular disease in a general population sample of 5,209 men and women aged 30 to 62 years. These subjects have been followed up for the development of cardiovascular disease including congestive heart failure. At every biennial examination each participant has had, in addition to a history and physical evaluation, a 12 lead electrocardiogram, a chest X-ray film, tests of vital capacity, urinalysis, measurements of blood sugar, uric acid and cholesterol levels and determinations of Framingham relative body weight.

Detailed descriptions of the sampling procedure, response rate, methods of examination and laboratory procedures and the criteria for the outcome of disease have been reported previously.²

From the Framingham Heart Disease Epidemiology Study, Framingham, Mass., and the National Heart and Lung Institute,* National Institutes of Health, Bethesda, Md. Manuscript accepted February 27, 1974.

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