FRAMINGHAM HEART STUDY

Study Category: The Cohort Studies (1947-1972)
Year Begun: 1948
Location: Framingham, Massachusetts, USA
Principal Investigator: Dawber, T. Royle

Background/Questions

The Framingham Study was born in the mind of Joseph Mountin, Assistant Surgeon General and head of the Division of Chronic Diseases of the U.S. Public Health Service, who saw cardiovascular diseases emerging after World War II and replacing infectious diseases as major killers. Invited by Harvard's David Rutstein, the study was set up in 1949 in Framingham, MA, a Boston suburb, and was soon after incorporated into the new National Heart Institute by NIH director, C.J. Van Slyke. His chief of biometrics, Felix Moore, provided estimates of the required sample size for a definitive epidemiological study having reasonable likelihood of establishing, in a 10 to 20-year period, the relationship of given characteristics to risk of death from heart attack. This resulted in a plan to recruit a two-thirds sample of Framingham men and women, 5000 to 6000 people, ages 30-59.

Early in-house opposition to epidemiological studies at NIH was overcome, in part due to arguments of Van Slyke's chief cardiological advisor, Boston cardiologist Paul Dudley White, consultant to presidents. He, in turn, had become interested, as a student of Sir James MacKenzie in the United Kingdom, in the natural history of heart diseases outside the clinical setting. Soon after, Roy Dawber was appointed Framingham director and brought a set of prior ideas to what was to become the best-known cohort study, The Framingham Study. Dawber states (1):

"The characteristics of persons who already have the disease are not necessarily the same as those that predispose to the disease. Observations of population characteristics must be made well before disease becomes overt if the relationship of these characteristics to the development of the disease is to be established with reasonable certainty. "

Method/Design

The on-going Framingham Study of the cohorts remains the responsibility of the National Heart, Lung, and Blood Institute, and is carried out under contract by researchers at the Boston University School of Medicine. It has been enlarged twice, in 1971 with the "Offspring Study" of original participants' children and their spouses, and in the late 1990s with the "Omni Study" of minorities. Every other year, after an extensive baseline examination, subjects undergo repeat testing that includes medical history, a blood profile, echocardiogram, and bone, eye, and other specialized tests.

Results

The Framingham Study was among the first groups that published together a landmark monograph on the predictive power of blood pressure, blood cholesterol level, and cigarette smoking habit for heart and blood vessel diseases. (2) In fact, the term "risk factor" is attributed to the investigators of Framingham, who have gone on to elaborate many central concepts and practical tools in the identification and prevention of elevated cardiovascular risk. For example:

- knowledge about the relationship between blood vessel diseases and blood cholesterol fractions, LDL ("bad cholesterol") and HDL ("good cholesterol")
- "multivariate risk," that is, the more-than-additive contribution to risk of multiple factors present together
- the greater predictive precision of systolic than diastolic blood pressure levels
- discounting the "common wisdom" that high blood pressure is less dangerous in women and the elderly
- the rising risk of cardiovascular diseases among women after the menopause
- the halving of heart attack risk within a few years after stopping smoking.

Conclusions

The Framingham Study, with congruent findings from other studies in the U.S. and abroad, sparked a revolution in understanding of the individual and the mass causes as well as the preventability of heart attack and stroke. It provided a sound basis for successful medical action and health promotion policy to reduce the death rate from these diseases.

Follow-up

The Framingham Study today has new emphases on the risk of particular disease manifestations such as heart failure, peripheral artery disease, stroke types, and arrhythmias. It explores new risk characteristics such as the apolipoproteins and their regulating genes, homocysteine, blood clotting factors, and inflammation. And its scope is widened to the study of a whole set of chronic conditions such as obesity, diabetes, and cardiac enlargement, and other diseases including osteoporosis, cancer, and Alzheimer's disease. Its emphasis is on individual causes and risk prediction rather than on the socio-cultural-environmental causes of common and epidemic diseases.

The study has recently produced two detailed histories of its evolution and contributions (4, 5). **(HB)**

References

Among an extensive literature of some 1,000 articles are these classic references to The Framingham Study:

1. DAWBER, T.R., 1980. The Framingham Study. The Epidemiology of Atherosclerotic Disease. Cambridge, MA: Harvard University Press.

2. DAWBER, T.R., MOORE, F.E., and MANN, G.V., 1957. Coronary heart disease in the Framingham Study. American Journal of Public Health, 47, 4-24.

3. KANNEL, W.B. , 1995. Clinical misconceptions dispelled by epidemiological research, the Ancel Keys lecture. Circulation. 92, 3350-3360.

4. Levy, D and S. Brink 2006. Change of Heart: Unraveling the Mysteries of Cardiovascular Disease. New York: Vintage.

5. http://www.framinghamheartstudy.org/about/history.html

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