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Diabetes and lifetime risk of coronary heart disease

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ARTICLE INFO

ABSTRACT

Introduction: Epidemiological estimate lifetime risk (LTR) is a measure that expresses the probability of disease in the remaining lifetime for individuals of a specific index age. These estimates can be useful for general audience targeted knowledge translation activities against diabetes. There are only a few reports on lifetime of impact of diabetes on coronary heart disease (CHD) events.
Methods: The Suita Study, a cohort study of cardiovascular diseases (CVD), was established in 1989. We included all participants who were CVD free at baseline. Age (in years) was used as the time scale. Age-specific incidence rates were calculated with person-year method within ten-year bands. We estimated the sex and index-age specific LTR of first-ever CHD with taking the competing risk of death into account.
Results: We followed 5559 participants without CHD history during 1989–2007 for 71,745.4 person-years. At age 40 years the competing risk of death adjusted LTR for all CHD were 16.61% for men without diabetes and 21.06% for men with diabetes. Therefore the LTD for CHD was higher by 4.45% for men with diabetes compared to men without. The competing risk adjusted LTR of CHD at 40 years of aged women was 9.18% for without diabetes and 14.21% for with diabetes. This increased LTR of CHD for diabetic patients were observed among both men and women across all index ages.

Conclusion: In this urban community based population we observed that diabetes has significant effect on the residual LTR of CHD among both men and women of middle age. This easy understandable knowledge can be used as important indexes to assist public health education and planning.

1. Introduction

Despite the reported low incidence and mortality from coronary heart disease (CHD) in Japan among all the industrialized countries [1–4], recent reports have suggested an increasing trend CHD in Japanese population [5,6]. In the backdrop of major dietary changes and worsening cardiovascular risk factors scenario [2–4,7], CHD is likely to be an increasingly important health burden in Japan. Especially with the aging of the population, CHD prevention activities require significant attention.

One of the major modifiable risk factors of CHD, which can be targeted for prevention at the population level, is high blood glucose or diabetes. Diabetes mellitus, the progressive insulin secretory defect on the background of insulin resistance, is one of the major risk factors for atherosclerosis leading to macrovasculopathy [8]. The diabetes related pro-atherogenic mechanisms, alone or combined with metabolic syndrome or high blood pressure, can lead to CHD among the patients with diabetes [9].

Effective risk communication is an important component for the disease prevention and is increasingly seen as crucial to the disease control effort. Diabetes being a modifiable risk factor of CHD, the impact of diabetes on the burden of CHD needs to be presented in easily understandable way to the lay audience, including at-risk population, patient population, health policy makers and health educators. Estimation of the lifetime risk (LTR) of CHD, which provides an absolute risk assessment, can be an important tool for knowledge translation because it would be more easily comprehensible by lay audience who are not that much numerically savvy to apprehend the conventional measures of disease burden. In this study we estimated the impact of diabetes on the short-, intermediate-term risk and LTR of CHD in a middle aged urban population in central Japan.

2. Population and method

2.1. Study sample

According to the census held in 1990, The Suita city had a total population of 345,206 with 89,972 men and 95,761 women of the age range of 30–79 years [10]. The Suita study is a cohort study for cardiovascular diseases among these urban residents [11–14]. The cohort was formed from randomly sampled Suita city residents aged 30–79 years, stratified by sex and age class (10-year increments) and 6483 men and women participated in a baseline survey (participant rate 53.2%) at the National Cardiovascular Center between September 1989
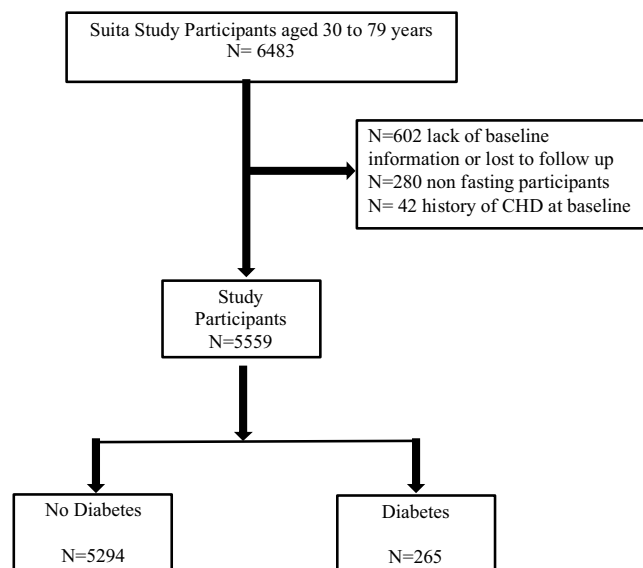

Fig. 1 – Cohort formation.

and March 1994. After excluding participants who lack baseline information or were lost to follow-up (n = 602), were not fasting before the blood glucose was measured (n = 280) and those who had a previous history of CHD (n = 42), data from the remaining 5559 participants (2628 men and 2931 women) were included in the analysis (Fig. 1). The Institutional Review Board of the National Cardiovascular Center approved this cohort study.

2.2. Measurement of blood glucose and categories

Measurement of blood glucose has been described elsewhere [15]. In brief, we performed routine fasting blood collection and immediately measured serum glucose levels using the same autoanalyzer (Toshiba TBA-80, Toshiba, Tokyo, Japan). Diabetes was defined as fasting serum glucose ≥ 7.0 mmol/l (126 mg/100 ml) or on any diabetes medications. Participants with fasting serum glucose <7.0 mmol/l (126 mg/100 ml) were defined as no-diabetes.

2.3. End-point ascertainment

For the current study, the endpoints were: (a) the first CHD event; (b) death; or (c) December 31, 2007. The first step in the survey for CHD involved checking the health status of all participants by repeated clinical visits every two years and yearly questionnaires sent by mail or conducted over telephone. The second step involved reviewing in-hospital medical records of