Relationship between cardiovascular risk factors and coronary calcification in a middle-aged Dutch population: the Imalife study

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Background: Systematic COronary Risk Evaluation (SCORE) has been proposed to assess the 10-year risk of fatal cardiovascular diseases, with distinction between low-risk and high-risk countries. Risk modifiers are recommended to further improve risk reclassification, for example the coronary artery calcium (CAC) score. CAC scoring can significantly improve risk prediction for coronary events based on outcome studies. The impact of CAC scoring on risk classification in a middle-aged cohort from a low-risk country in comparison to SCORE is unknown.

Purpose: To assess presence of coronary calcification and association with cardiovascular risk factors and related SCORE risk in a middle-aged population from a low risk country.

Methods: Coronary calcification and classical cardiovascular risk factors were analyzed in 4,083 Dutch participants aged 45–60 years (57.9% women) without a known history of coronary artery disease in the population-based ImaLife (Imaging in Lifelines) study. Individuals underwent non-contrast cardiac CT using third generation dual-source CT. Coronary artery calcium (CAC) scores were quantified using Agatston's method. Age- and sex- specific distributions of CAC categories (0, 1–99, 100–299, ≥300) and percentiles were assessed. Distribution of CAC categories was compared to SCORE risk categories (<1%, ≥1% to 5%, and ≥5%) for low risk countries. Relationship between risk factors and CAC presence was evaluated by logistic regression models. Population attributable fractions (PAFs) of classical risk factors for CAC presence were estimated to investigate potential prevention strategy.

Results: CAC was present in 54.5% of men and in 26.5% of women. With increasing age, an increasing percentage had a positive CAC score, from 38.1% of men and 15.2% of women at age 45–49 years, to 66.9% of men and 36.6% of women at age 55–60. Mean SCORE was 1.3% (2.0% in men, 0.7% in women). In SCORE risk <1%, 32.7% of men and 17.1% of women had CAC. In men with SCORE risk ≥5% (0.1% of women), 26.9% had no CAC. Overall PAF for presence of CAC of the classical risk factors was 18.5% in men and 31.4% in women. PAF was highest for hypertension (in men 8.0%, 95% CI 4.2–11.8%; in women 13.1%, 95% CI 7.9–18.2%) followed by hypercholesterolemia and obesity.

Conclusion: In this middle-aged Dutch cohort, slightly over half of men and a quarter of women had any CAC. With age there was an increase in CAC presence for both sexes. Only a minor proportion of CAC presence was attributable to classical risk factors. This provides further support that CAC scoring can impact risk classification in a middle-aged population of a low-risk country.