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IMPACT OF CARDIOVASCULAR DISEASE RISK FACTORS IN MIDDLE AGE ON LATER AGES OF LIFE A LIFE COURSE APPROACH

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Contexts

Recent study concludes that life course epidemiology has challenged the contentment of the adult lifestyle model of chronic disease risk. Many risk factors have been established for cardiovascular disease (CVD) incidence and premature death but the impact of multifactoral risk factors on the life expectancy with cardiovascular disease and without cardiovascular disease have not been investigated. People with favorable risk profiles of CVD in middle age survive several years longer and consume lower average annual costs for medical care in older age compared to the higher risk group. It is unknown whether such risk profiles also decrease the lifetime probability of cardiovascular disease and the duration of life with and without cardiovascular disease.

Methods

We focus on the important CVD risk factors during adulthood (especially from age 30 to 50) and their impact on CVD and mortality at later ages of life. Using first 48 years follow-up of the Framingham Heart Study original cohort, we construct multistate life table for the optimal and high risk groups. Optimal risk is defined if an individual was never smoker, on average had optimal blood pressure (BP<120), optimal cholesterol level (SCL<200) and optimal BMI (BMI<25) during age 30 to 50. If an individual was smoker, had high blood pressure (BP>140), high cholesterol (SCL>240) and was obese (BMI>30) he or she was in high risk group. We construct multistate life tables in multiple-covariates context i.e. bridged multivariate regression model and multistate life table. We estimate the age specific transition rates adjusted for covariates from regression models and use these estimated rates to construct multistate life table. For life table construction, the rates are converted into probabilities by assuming that within each single year age interval the hazard remains constant and taking into account the competition between risks from a single state.

The events considered are death, and onset of: all cardiovascular disease (CVD); all coronary heart disease and acute myocardial infarction. All coronary heart disease includes angina pectoris, coronary insufficiency, myocardial infarction and sudden death. All cardiovascular disease includes all coronary heart disease, all cerebrovascular disease (including stroke), intermittent claudication and congestive heart failure. Analyses were performed separately for each sex. This allows comparison of the life years lived with and without cardiovascular disease and life time risk of cardiovascular disease for optimal risk and high risk group. The basic multi-state life table structure has the state space {Healthy, history of CVD*, dead}, where each of the five life table models has CVD* represented by one of the specific CVD states (all cardiovascular disease, all coronary heart disease, acute myocardial infarction). For example, in the life table for all CVD, the possible transitions are, "no CVD" to "death", "no CVD" to "history of CVD", and "history of CVD" to "death".

Results

On average 4 in 5 male/female of optimal risk free of cardiovascular disease at age 50 would still alive and free of cardiovascular disease twenty years later, only 2 or 3 in 10 of high risk, would remain in this state. The differences of the additional survival years between males and females by optimal and high-risk profiles are almost 14 years. A fifty year-old male with an optimal risk profile can expect to survive 6 additional years compared to the total male population in the FHS. Similarly, fifty year-old females in the optimal risk group, can expect to survive 5 additional years compared to the total females in the FHS. At age 50, a male with an optimal risk profile can expect to survive 17 years more free of cardiovascular disease compared to a subject with a high-risk profile; a similarly aged female can expect to survive an extra 16 years compared to females with a high-risk profile. A high-risk profile at middle age shortens the duration of life, increases the lifetime probability of experiencing CVD and extends the period of life spent with cardiovascular disease. As the optimal risk profile increases the number of years lived free of cardiovascular disease and decreases the years lived with cardiovascular disease, we can conclude that an optimal risk profile for major cardiovascular disease risk factors in middle age compresses cardiovascular morbidity.

Conclusions

High risks at adulthood shorten the duration of life, increase the lifetime probability of experiencing CVD but extend the life with cardiovascular disease. Optimal risk profile increase the remarkable number of years lived free of cardiovascular disease and compress cardiovascular morbidity.