Coronary artery disease: medical therapy

James Ker, MBChB, MMed, MD
Faculty of Health Sciences, University of Pretoria

 Reprinted with permission from S Afr Fam Pract 2010;52(4):305-306

Introduction

It is estimated that at the age of 40 years, the lifetime risk to develop coronary artery disease is one in two for men, and one in three for women.[1] Atherosclerotic coronary artery disease begins in childhood, and risk factors influence the development of atherosclerosis throughout one's lifetime.[2]

A standardised case-control study of acute myocardial infarction in 52 countries, representing every inhabited continent, demonstrated that nine cardiovascular risk factors in all the countries were responsible for 90% of the population-attributable risk in men, and 94% in women. These nine factors were dyslipidaemia, hypertension, smoking, diabetes, abdominal obesity, a diet that is poor in daily fruit and vegetable consumption, lack of regular physical activity, low daily alcohol intake, and psychological factors (mainly depression).[3]

Elevated cholesterol is the driving force behind atherogenesis. Evidence indicates that a lifetime low low-density lipoprotein (LDL) cholesterol level lowers the risk of atherosclerotic coronary artery disease by up to 80%, compared with the general population. Intensive LDL-lowering therapy reduces the risk of atherosclerotic heart disease by 40-50%.[4]

What is happening globally?

In industrialised countries, the rates of heart disease-related deaths are being diminished, due to lipid-lowering therapy, hypertension treatment, and a reduction in smoking. The largest contribution came from secondary preventive treatments for patients after myocardial infarction and revascularisation. Each death that is avoided by treating a patient with recognised coronary heart disease can yield an additional 7.5 years of life. Risk-factor reduction has been shown to account for up to 79% of the total life-years gained in certain populations. Would it not be considerably more beneficial to start much earlier in a person's life to reduce the impact of cardiovascular risk factors, through early recognition and treatment? New trends are emerging. There has been an increase in the prevalence of hypertension, obesity, and diabetes mellitus,[5] in contrast to developing countries, in which the prevalence of atherosclerotic-related heart disease is increasing.

What works in therapy?

Cessation of smoking is associated with a relative risk reduction in mortality of up to 36%.[6] The benefits of smoking cessation are greater, and accrue more rapidly, in comparison to other important cardiovascular interventions. Patients who survived a myocardial infarction, and then quit smoking, reduced their mortality risk by 37% [95% confidence interval (CI) 18-52%], as compared to persistent smokers. Observational studies persistently reported a decreased number of coronary heart disease events in people who perform regular aerobic activity. Even one hour of walking per week is associated with a lower risk.

Reducing LDL-cholesterol by 1.5 mmol/l reduces the incidence of ischaemic heart disease and ischaemic stroke, independent of age or blood pressure, by a third.[7]

Reducing dietary salt by 3 g per day can reduce blood pressure, new cases of coronary heart disease, stroke, and deaths, to a similar level as the effect of other risk factor reduction.[8]

Aspirin, used for primary prevention, can reduce the relative risk of a non-fatal myocardial infarction by 23%, but has no effect on mortality. In secondary prevention, aspirin reduces the risk of non-fatal myocardial infarction by about 31%, and the relative risk of death by nine per cent.[9]

Niacin can reduce major coronary events by ± 25% (95% CI 13-35%) according to a meta-analysis.[10] In patients with stable ischaemic (coronary) heart disease and a normal left ventricular ejection fraction, a meta-analysis showed that angiotensin-converting enzyme (ACE) inhibitors reduced the relative risk of mortality by 13% (95% CI 6 to 19%), and non-fatal myocardial infarction by 17% (95% CI 6-27%).[11] In the same meta-analysis, angiotensin-receptor

blockers (ARBs) reduced a composite of cardiovascular mortality, non-fatal myocardial infarction and stroke by 12% (95% CI 0-25%). Beta blockers, used as a secondary prevention measure, can reduce mortality and reinfarction by up to 23% (95% CI 16-30%).[12]

After a myocardial infarction, the use of N-3 polyunsaturated fatty acids, results in a 45% reduction in sudden death, and a 30% reduction in cardiovascular deaths.[13]

How effective is optimal medical therapy?

In a large trial, the use of five drugs [aspirin, clopidogrel, a beta blocker, a statin, and a renin-angiotensin system blocker (ACE inhibitor or ARB) was tested vs. the use of one of these drugs, or none, in survivors of a first acute myocardial infarction. After one year, the use of the five drugs reduced the relative risk of mortality by 74% (95% CI 62-82%)[13] vs. one, or none, of the drugs used.[14]

In the chronic artery disease setting, non-adherence to cardioprotective medications (beta blockers, statins, and ACE inhibitors) was associated with a 10-40% relative increase in risk of cardiac hospitalisations, and a 50-80% relative increase in mortality.[15]

What does not work?

Dietary supplements, herbal preparations, and alternative therapies, are popular with patients, but they are of dubious benefit.[16] The data for most of these interventions are inconclusive.

Vitamin E supplements and antioxidant therapy for primary and secondary prevention of atherosclerotic cardiovascular events had no effect. Increased mortality was even suggested with the use of Vitamin E. Garlic, when tested vs. placebo, had no effect on LDL cholesterol levels.

Reducing homocysteine levels, by using folic acid and B vitamins, has not shown any benefit in many randomised trials.

References

1. DM, Larson MG, Beiser A, et al. Life-time risk of developing coronary artery disease. Lancet. 1999;353(9147):89-92.
2. Berenson GS, Pickoff AS. Preventive cardiology and its potential influence on the early natural history of adult heart disease: the Bogulusa Heart Study and the Heart SMART Program. Am J Med Sci. 1995;310 Suppl 1:S135-S128.
3. Yusuf S, Hawken S, et al. Effect of potentially modifiable risk factor associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004;364(9438):937-952.
4. Grundy SM. Is lowering low-density lipoprotein (LDL) an effective strategy to reduce cardiac risk? Circulation. 2008;117:569-573.
5. Brown JR, O'Connon GT. Coronary heart disease and prevention in the United States. N Engl J Med. 2010;362(23):2150-2153.
6. Critchley JA, Capewell S. Mortality risk reduction associated with smoking cessation in patients with coronary heart disease: a systematic review. JAMA. 2003;290(1):86-97.
7. Baigent C, Keech A, Kearney PM, et al. Efficacy and safety of cholesterol-lowering treatment: prospective meta-analysis of data from 90,056 participations in 14 randomised trials of statins. Lancet. 2005;366(9493):1267-1278.
8. Bibbens-Domingo K, Chertow GM, Coxson PG, et al. Projected effect of dietary salt reductions on fatal cardiovascular disease. N Engl J Med. 2010;362(7):590-599.
9. Antithrombotic Trialists' (ATT) Collaboration, Baigent C, Blackwell L, et al. Aspirin in the primary and secondary prevention of vascular disease: collaborative meta-analysis of individual participant data from randomised trials. Lancet. 2009;373(9678):1849-1860.
10. Bruckert E, Labreuche J, Amarenco P. Meta-analysis of the effect of nicotinic acid alone or in combination on cardiovascular events and atherosclerosis. Atherosclerosis. 2010;210(2):353-361.
11. Baker WL, Coleman CI, et al. Systematic review: comparative effectiveness of angiotensin converting enzyme inhibitors or angiotension-II-receptor blockers for ischaemic heart disease. Ann Intern Med. 2009;151(12):861-871.
12. Chae CJ, Hennekens CH. Beta blockers. In: Hennekens CH, editor. Clinical trials in cardiovascular disease: a companion to Braunwald's heart disease. Philadelphia: WB Saunders, 1999; p. 84.
13. Khavandi A, Khavandi K, Greenstein A, et al. N-3 polyunsaturated fatty acids are still underappreciated and underused post myocardial infarction. Heart. 2009;95(7):540-541.
14. Bramlage P, Messer C, Bitterlich M, et al. The effect of optimal medical therapy on 1-year mortality after acute myocardial infarction. Heart. 2010;96(8):604-609.
15. Ho PM, Magid DJ, Shetterly SM, et al. Medication non-adherence is associated with a broad range of adverse outcomes in patients with coronary artery disease. Am Heart J. 2008;155(4):772-779.
16. Lewis SJ. Prevention and treatment of atherosclerosis: a practitioner's guide for 2008. Am J Med. 2009;122(1 Suppl):S38-S50.