Severe hypercholesterolaemia with a high risk of atherosclerosis may be precipitated by a high-sterol diet

To the Editor: Increasing dietary fat intake impacts variably on the plasma lipid profile, and the consequent dyslipidaemia influences cardiovascular risk from atherosclerosis. For most patients, cardiovascular risk can be calculated as advised in the South African (SA) guideline for dyslipidaemia,[1] but inherited disorders carry much higher risk than so calculated. Monogenic disorders causing low-density lipoprotein cholesterol (LDL-C) concentrations >5 mmol/L, such as heterozygous familial hypercholesterolaemia (FH) or homozygous FH with LDL-C concentrations >13 mmol/L, confer much higher risk. In untreated heterozygous and homozygous FH, coronary artery disease events typically occur in the 5th decade and 2nd decade, respectively. These disorders require medication regardless of the risk calculation. Uncommonly, persons with moderate hypercholesterolaemia (LDL-C 3 - 5 mmol/L) or with more severe LDL hypercholesterolaemia can respond to dietary alterations with marked increases of LDL concentration due to underlying genetic defects. One of these disorders is phytosterolaemia, in which hypercholesterolaemia coexists with an elevated plasma plant sterol concentration. This serious condition caused fatal atherosclerosis in a teenager.[2] Phytosterolaemia responds well to dietary sterol restriction and ezetimibe but poorly to statin treatment. We wish to draw attention to this disorder because a high-fat diet that included much plant sterol precipitated severe hypercholesterolaemia in a patient.

A white male developed diabetes mellitus that has been controlled well by insulin injections since the age of 14 years. His father has severe hypercholesterolaemia with premature vascular disease and his mother is also treated for hypercholesterolaemia. Her mother had premature coronary artery disease. At 22 years of age the patient became a triathlete. He is muscular in appearance, lacks stigmata of dyslipidaemia and has a body mass index of 26.5 kg/m^2. His triglyceride and high-density lipoprotein cholesterol concentrations are unremarkable. He had an elevated LDL-C concentration of 6.1 mmol/L for which simvastatin (20 mg at night) was prescribed on suspicion of FH; however, it was discontinued because there was a poor response (LDL-C 5.2 mmol/L). To improve athletic performance, he adopted a high-fat diet. Intake of eggs as well as seeds and nuts increased. An LDL-C concentration of 13.0 mmol/L was recorded. There were no secondary causes of hypercholesterolaemia. Non-invasive computed tomography coronary angiography revealed no coronary artery calcium and there was no evidence of soft plaque. Phytosterolaemia was suspected. Reducing dietary sterol intake together with ezetimibe (10 mg daily) lowered the LDL-C concentration by 71% to 3.8 mmol/L. Phytosterolaemia was confirmed by gas chromatography.

Hypercholesterolaemia suggestive of FH is not rare and occurs at a high prevalence in several communities in SA. Hypercholesterolaemia due to FH responds well to statins. Phytosterolaemia is rare and may result in severe to extreme hypercholesterolaemia and atherosclerosis on a sterol-rich diet, especially one containing much plant sterols. Phytosterolaemia responds well to dietary modification and ezetimibe. In view of the gravity of FH and phytosterolaemia, we recommend that plasma cholesterol and triglyceride measurements should be done before as well as after embarking on a high-fat diet, to ensure that high cardiovascular risk receives appropriate attention.

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1. Klug EQ, Raal FJ, Marais AD, et al. South African dyslipidaemia guideline consensus statement. S Afr Med J 2012;102(3 Pt 2):178-187.
2. Salen G, Horak I, Rothkopf M, et al. Lethal atherosclerosis associated with abnormal plasma and tissue sterol composition in sitosterolemia with xanthomatosis. J Lipid Res 1985;26(9):1126-1133.

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