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Editorial

Coronary heart disease in Indians, Pakistanis, and Bangladeshis: aetiology and possibilities for prevention

High rates of coronary heart disease in people of South Asian (Indian, Pakistani, and Bangladeshi) origin were first reported from Singapore, South Africa, and Trinidad in the 1950s;[1] similar findings were recorded in the United Kingdom at the time of the 1971 census.[2,3] Reliable population-based data on coronary mortality from South Asia are not available but in two northern Indian cities the prevalence of electrocardiographic major Q waves was reported to be at least as high as in European populations.[4,5] In England and Wales in 1979–83 coronary mortality was 36% higher in men born in South Asia and 46% higher in women born in South Asia aged 20–69 years than in the general population.[6] This narrowing of the sex difference in coronary risk occurs in other overseas South Asian populations; in South Africa in 1985 the relative risk of coronary death in Indians compared with Europeans was 1·3 in men and 1·7 in women.[7] The relative risk of coronary disease in South Asian men is highest at early ages: in 1979–83 coronary mortality in men aged less than 40 years born in South Asia was more than twice the national average.[6] The high coronary mortality is common to Gujarati Hindus, Punjabi Sikhs, and Muslims from Pakistan and Bangladesh.[8,9] The consistency of the high risk of coronary heart disease in urban South Asian populations around the world, affecting both sexes and with early onset, suggests a common underlying explanation.

The clinical picture in South Asian patients with coronary heart disease is similar to that in Europeans. Smoking in South Asian patients is generally less common, average plasma cholesterol concentrations are lower and diabetes is more common than in European patients.[10,11] In patients referred for angiography the anatomical distribution of disease does not differ between South Asians and Europeans although the extent and severity of lesions are greater in South Asians.[10,12] In population surveys differences between South Asians and Europeans in smoking, blood pressure, serum cholesterol, or haemostatic activity do not explain the high risk in South Asians.[13–15] Smoking rates are higher in Bangladeshi men[15] and average blood pressures are higher in Sikhs[16] than in the native British population but in other groups from South Asia the levels of these risk factors are similar to or lower than the average for the general population. Plasma cholesterol concentrations are similar to or lower than the national average in all main groups of South Asian origin.[14–16] Atherogenic constituents in ghee (clarified butter) used in north Indian cooking have been suggested as a possible cause of high coronary risk in South Asians[17] but this fails to explain the high risk in people originating from southern India[8] where ghee is less commonly used.

Non-insulin dependent diabetes is present in about 20% of South Asian men and women aged over 40 years in the United Kingdom, compared with about 5% of Europeans.[16] Similar prevalence rates have been reported for other overseas South Asian populations[1] and for an urban population in southern India.[18] Most South Asian patients with coronary disease are not diabetic[11] and glucose intolerance cannot alone explain more than a small proportion of the excess coronary risk in South Asian people.[19] It is now clear that the high prevalence of diabetes in South Asians is but one manifestation of a pattern of physiological disturbances related to insulin resistance in this group:[15,16] these disturbances include hyperinsulinaemia, hypertriglyceridaemia, low concentrations of plasma high density lipoprotein cholesterol, and hypertension. The mechanisms underlying these associations are poorly understood. Resistance to insulin-stimulated glucose uptake is probably responsible for the glucose intolerance, hyperinsulinaemia, and hypertension. Failure of insulin to suppress release of non-esterified fatty acids from adipose tissue may cause hypertriglyceridaemia,[20] low plasma concentrations of high density lipoprotein cholesterol, and changes in the composition and size of particles in the low density lipoprotein fraction.[21] Insulin resistance is associated with a pattern of obesity in which a high proportion of body fat is deposited intra-abdominally; this central obesity tends to develop in South Asians although the average body mass index is no higher in South Asian men than in European men.[16] The ability to store fat in intra-abdominal depots and rely on non-esterified fatty acids rather than glucose as fuel for muscle may have been selected as a thrifty genotype[22] in a time of scarcity.

The insulin resistance hypothesis provides a unifying explanation for the high rates of both non-insulin-dependent diabetes and coronary disease in South Asians. The lessening of the sex difference in coronary risk in this group is also explicable because insulin resistance is associated with several risk factors that are normally less prevalent in women than in men: these include central obesity, raised concentrations of plasma triglyceride, and lower concentrations of plasma high density lipoprotein cholesterol. A similar loss of female protection against coronary heart disease occurs in non-insulin-dependent diabetes.[23] If the high risk of coronary artery disease common to all groups originating from South Asia results from insulin resistance, this effect cannot be mediated mainly through blood pressure or high density lipoprotein cholesterol: blood pressures are not high in Muslims or Gujarati Hindus, and the concentration of high density lipoprotein cholesterol is no lower in Sikhs than in native British men.[16]

A reduction in the risk of coronary heart disease in South Asians is likely to require different strategies from those recommended for the general population. Control of smoking may help to reduce coronary risk in Hindu and Muslim men, whose smoking rates are similar to the national average, but not in South Asian women or Sikh men who rarely smoke.[16] The basis for advising South Asian communities to reduce saturated fat intake on a mass scale so as to lower average plasma cholesterol is open to question. In Gujarati Hindus saturated fat intake and plasma cholesterol are considerably lower than the national average,[13 14 16] yet mortality from coronary disease in this group is at least as high as in other groups from South Asia whose saturated fat intake and plasma cholesterol are close to the national average.[8 9] Control of obesity and increased physical activity are likely to be the most effective means of reducing the risk of coronary disease in South Asians if the insulin resistance hypothesis is correct. Criteria for ideal weight based on data for Europeans may be inappropriate for South Asians because of differences in body frame size and fat distribution. The efficacy of weight loss and physical training in reversing insulin resistance in South Asians has yet to be demonstrated. Prevention of diabetes and coronary disease may require control of obesity and regular exercise to be maintained throughout life in South Asians.

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1 McKeigue PM, Miller GJ, Marmot MG. Coronary heart disease in South Asians overseas—a review. *J Clin Epidemiol* 1989;**42**:597–609.
2 Tunstall Pedoe H, Clayton D, Morris JN, Brigden W, McDonald L. Coronary heart attacks in East London. *Lancet* 1975;ii:833–8.
3 Marmot MG, Adelstein AM, Bulusu L. Lessons from the study of immigrant mortality. *Lancet* 1984;i:1455–58.
4 Sarvotham SG, Berry JN. Prevalence of coronary heart disease in an urban population in northern India. *Circulation* 1968;**37**:939–53.
5 Chadha SL, Radhakrishnan S, Ramachandran K, Kaul U, Gopinath N. Epidemiological study of coronary heart disease in urban population of Delhi. *Indian J Med Res* 1990;**92**:424–30.
6 Balarajan R. Ethnic differences in mortality from ischaemic heart disease and cerebrovascular disease in England and Wales. *Br Med J* 1991;**302**:560–4.
7 Steinberg WJ, Balfe DL, Kustner HG. Decline in the ischaemic heart disease mortality rates of South Africans, 1968–1985. *S Afr Med J* 1988;**74**: 547–50.
8 Balarajan R, Adelstein AM, Bulusu L, Shukla V. Patterns of mortality among migrants to England and Wales from the Indian subcontinent. *Br Med J* 1984;**289**:1185–7.
9 McKeigue PM, Marmot MG. Mortality from coronary heart disease in Asian communities in London. *Br Med J* 1988;**297**:903.
10 Lowry PJ, Glover DR, Mace PJ, Littler WA. Coronary artery disease in Asians in Birmingham. *Br Heart J* 1984;**52**:610–13.
11 Hughes LO, Cruickshank JK, Wright J, Raftery EB. Disturbances of insulin in British Asian and white men surviving myocardial infarction. *Br Med J* 1989;**299**:537–41.
12 Hughes LO, Raval U, Raftery EB. First myocardial infarctions in Asian and white men. *Br Med J* 1989;**298**:1345–50.
13 McKeigue PM, Marmot MG, Adelstein AM, *et al.* Diet and risk factors for coronary heart disease in Asians in north-west London. *Lancet* 1985; ii:1086–90.
14 Miller GJ, Kotecha S, Wilkinson WH, *et al.* Dietary and other characteristics relevant for coronary heart disease in men of Indian, West Indian and European descent in London. *Atherosclerosis* 1988;**70**:63–72.
15 McKeigue PM, Marmot MG, Syndercombe Court YD, Cottier DE, Rahman S, Riemersma RA. Diabetes, hyperinsulinaemia and coronary risk factors in Bangladeshis in east London. *Br Heart J* 1988;**60**:390–6.
16 McKeigue PM, Shah B, Marmot MG. Relation of central obesity and insulin resistance with high diabetes prevalence and cardiovascular risk in South Asians. *Lancet* 1991;**337**:382–6.
17 Jacobson MS. Cholesterol oxides in Indian ghee: possible cause of unexplained high risk of atherosclerosis in Indian immigrant populations. *Lancet* 1987;ii:656–8.
18 Ramachandran A, Jali MV, Mohan V, Snehalatha C, Visnawathan M. High prevalence of diabetes in an urban population in south India. *Br Med J* 1988;**297**:587–90.
19 Miller GJ, Beckles GLA, Maude GH, *et al.* Ethnicity and other characteristics predictive of coronary heart disease in a developing country—principal results of the St James survey, Trinidad. *Int J Epidemiol* 1989;**18**: 808–17.
20 Yki-Jarvinen H, Taskinen M-R. Interrelationships among insulin's antilipolytic and glucoregulatory effects and plasma triglycerides in nondiabetic and diabetic patients with endogenous hypertriglyceridemia. *Diabetes* 1988;**37**:1271–78.
21 Peeples LH, Carpenter JW, Israel RG, Barakat HA. Alterations in low-density lipoproteins in subjects with abdominal adiposity. *Metabolism* 1989;**38**:1029–36.
22 Neel JV. Diabetes mellitus: a 'thrifty' genotype rendered detrimental by 'progress'. *Am J Hum Genet* 1962;**14**:353–62.
23 Barrett-Connor EL, Cohn BA, Wingard DL, Edelstein SL. Why is diabetes mellitus a stronger risk factor for fatal ischemic heart disease in women than in men? The Rancho Bernardo Study. *JAMA* 1991;**265**:627–31.