South Asians and their increased cardiovascular risk: A review of risk factors and diet and lifestyle modification

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Abstract

South Asians (SAs) have a significantly higher incidence and severity of type 2 diabetes and cardiovascular disease (CVD) than Caucasians and can present with atypical ischaemic symptoms. This can present a challenge for health professionals who may not be aware of the lowered thresholds recommended for SA body mass index, waist circumference and age. Although SAs are likely to have all the hallmarks of metabolic syndrome: central obesity, insulin resistance, impaired glucose tolerance, reduced high density lipoprotein, high triglycerides and hypertension, conventional risk factors alone do not fully predict the increased CVD risk among this community. Furthermore, SAs themselves may not be aware of their increased predisposition to disease nor of the dietary and lifestyle modifications which could reduce the risk and severity of their condition. Even where some modification has been attempted, there may be cultural pressure to conform to a traditional diet and the requirements for fasting and feasting. Principally, SAs should avoid large late meals, reduce sugary sweets and drinks, alcohol and foods fried in plant oils which create damaging transfats, while increasing protein and non-fried vegetables to help glycaemic control. Chewing paan, with or without added tobacco, is a particular risk factor for both CVD and cancer, on a par with the dangers of smoking. Although not in the culture, exercise would also be of great benefit.

Introduction

South Asians (SAs), originating from the Indian subcontinent, are the largest ethnic minority in several European nations. Compared to Caucasian populations, SAs have a higher incidence and severity of cardiovascular disease (CVD) and its complications at a younger age and have a 40-60% higher risk of disease-related mortality. This has prompted the suggestion that SA CVD should be viewed as a separate condition to that found in Caucasians or that SA ethnicity is itself a risk factor. This article discusses the principal challenges in assessing SAs and provides dietary and lifestyle measures to help these patients.

Lowered thresholds for SAs

The guidelines and thresholds for diagnosis, prevention or treatment are largely based on Caucasians, with consequent concern that risks and early disease presentation for SAs may be overlooked. The thresholds principally fail to allow for the SA unique pattern of body fat distribution and abdominal obesity, with higher total body fat percentage and amount of subcutaneous and visceral adipose tissue but less lean body mass for the same BMI as Caucasians. In addition, a higher SA waist-to-hip (WTH) ratio contributes to higher CVD and metabolic syndrome rates. Furthermore, for every level of BMI, SAs are more insulin resistant and more prone to glucose intolerance, T2D and dyslipidaemia than Caucasians. The UK South Asian Health Foundation (SAHF) recommends BMI cut-off levels of 23kg/m² for overweight adults and 25kg/m² for obesity (instead of 25kg/m² and 30kg/m² respectively) as SA thresholds for dietary and lifestyle intervention. Other international organisations recommend a waist circumference threshold of 90cm for SA men (94cm in European men), with impaired fasting glucose level at 100mg/dl.

A further concern is that SAs with acute myocardial infarction (MI) may present with atypical symptoms and at a younger age, leading to delay in diagnosis and treatment, while even SA children and neonates are now developing metabolic syndrome and CVD. Additionally, SAs are not a homogeneous population, with Bangladeshis generally having higher risk factors and earlier disease incidence and considerable differences between other SA ethnicities. One contributory factor may be ‘foetal origin’, where maternal malnutrition results in low birth weight, with its role in CVD and T2D development, particularly if by age 8 children have a high weight and fat mass.

South Asians and key CVD risk factors

The principal CVD risk factor among SAs is T2D, with up to five times higher disease incidence than Caucasians, and onset occurring up to ten years earlier. SA T2D patients may present with more complications and can suffer a 40% increase in MI incidence and four times higher CV mortality. SAs are also likely to have the hallmarks of metabolic syndrome: central obesity, insulin resistance, impaired glucose tolerance, low HDL, high triglycerides and hypertension.

Conventional risk factors, even with lowered thresholds, cannot fully predict the increased CVD risk in SAs. The INTERHEART study, however, found nine MI risk factors which are valid in all ethnicities, albeit at a younger age in SAs. These include T2D, smoking, hypertension, high WTH ratio, high apoB100/apoA1 ratio, stress/depression, inactivity, high alcohol consumption and low fruit and vegetable consumption. In addition, immigrants who adopt western dietary habits and lifestyles could be at even greater risk than those in the Indian subcontinent. Some researchers have also suggested that the smaller coronary arteries found in SAs cause increased
stenosis but after correction for body surface area there was no difference in coronary artery diameter between SAs and Caucasians, notwithstanding the potential implications for intervention procedures\(^4\).

The SAHF and others recommend that SAs are given routine WTH measurement and testing of fasting glucose and lipids and suggest that a truer adjusted risk can be obtained by multiplying the Framingham risk score by 1.4 or adding 10 years to the SA patient’s age\(^4\). Diabetes UK and the SAHF also recommend using the total cholesterol to HDL ratio, rather than total cholesterol alone\(^5\).

**South Asian knowledge of and attitudes to health risks**

A UK National Health Service survey found that many SAs are unaware of their increased risk of CVD and T2D. Even when they have developed disease, SAs are often not aware of related causes and complications or preventive measures, such as healthier foods or cooking methods, despite public health campaigns and publicity\(^1\). An additional problem is that SAs are reluctant to accept that amelioration of their condition is within their control. Diabetics regularly visited by a specialist nurse or dietitian showed no significant improvement in diabetes knowledge or self-management\(^5\) regardless of the presence of Asian link workers\(^5\). They continued with their previous dietary habits despite detriment to glycaemic control\(^4\) and even after suffering a cardiac event\(^5\). Additionally, South Asian T2D and CVD patients find it difficult to adhere publicly to a healthy dietary or lifestyle programme\(^6\), resulting in any glycaemic control which may be achieved in the home being overturned by fasting and festivals\(^1\), possibly through fear of alienation from the SA community\(^5\). Fasting can result in severe hypoglycaemia while a large sunset meal, often high in fats and sugars, can promote hyperglycaemia, the worst possible combination for SAs\(^6\).

**Dietary and lifestyle recommendations**

Most risk factors can be significantly lowered by diet and lifestyle modification and it is worth persevering with attempts to educate SAs as to the protective means which are within their control. In an intervention trial of 1000 SAs with angina, MI or risk factors, those given a diet rich in whole grains, fruits, vegetables and nuts with healthier oils showed significant improvement\(^5\). One key problem is that SAs tend to eat significantly fewer meals per day than Caucasians, with a large late evening meal\(^5\). This promotes hypoglycaemia during the day, with the need to snack, followed by hyperglycaemia following the large late night meal, which would also impact adversely on digestion and sleep patterns.

**Mealtimes**

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**Fruit and vegetables**

Although many SAs are vegetarians, their plant intake is low\(^5\), with resultant low micronutrient levels, thought to exacerbate risk of atherosclerosis, CHD and T2D\(^5\). Regular high fruit and vegetable consumption is associated with a 30% reduction in acute MI risk among SAs\(^2\) and is inversely associated with metabolic syndrome risk factors\(^8\). SAs also tend to overcook vegetables, which can destroy 90% of the nutrient content\(^5\). Many traditional SA vegetables and herbs have hypoglycaemic properties\(^8\) but have recently been abandoned in favour of Western foods\(^5\). Fruits and root vegetables have a high glycaemic index (GI) and should be eaten sparingly\(^7\).

**Carbohydrates**

The high carbohydrate content of the typical SA diet increases plasma glucose, insulin and triglyceride levels and lowers HDL and is positively correlated with insulin resistance, insulin levels and T2D development\(^5\). Intake of rice, breads and potato has been found to be particularly high among SA MI patients\(^5\). Most of the SA energy intake comes from refined (white) flour or rice, which is a risk factor for metabolic syndrome\(^7\). Refined grains are lower in dietary fibre, have lost many of their beneficial nutrients and are often high GI foods\(^7\). By contrast, the fibre content of complex (unrefined) carbohydrates slows the release of glucose into the blood\(^7\).

**Sugar and sweetened drinks**

Sugar intake is positively correlated with insulin resistance\(^7\), while reduction is associated with higher HDL\(^7\). Traditional Indian sweets are predominantly fried sugar and fat, so should be avoided on all counts. Brown sugar (ghor) and honey may mistakenly be considered healthy, but actually have a similar effect on blood glucose as white sugar\(^7\). Undiluted fruit juice or sweetened drinks, particularly with high fructose corn syrup, markedly increase T2D risk\(^7\).

**Fats**

The principal problem for SAs is the high intake of hydrogenated oils and trans fats\(^5\), which are associated with increased incidence of diabetes\(^5\) and CVD\(^5\) and can interfere with the formation of protective long chain omega-3 polysaturated fatty acids (PUFAs), raising LDL and lowering HDL\(^5\). SAs regularly use vegetable oils (vanaspati or vegetable ghee) for cooking. When exposed to high temperatures, the cis double bonds in these oils are converted to trans form, creating the dangerous trans fats\(^5\). Virtually all SA commercially produced foods and fried snacks have been made with vanaspati heated to very high temperatures and in some foods the trans fat content can be up to 40%\(^5\). Furthermore, ghee (clarified butter) is more atherogenic than ordinary butter as it contains oxidised lipids\(^5\). Frequent use of ghee also leads to increased plasma trans fats and decreased omega-3 PUFAs\(^5\) and is associated with increased risk of MI\(^5\).

SA diets are also low in beneficial omega-3 PUFAs (found as fish oils) and mono-unsaturated fats (mainly olive oil). By contrast, diets high in these fats increase HDL cholesterol and improve insulin sensitivity\(^5\). Several meta-analyses of intervention studies have shown that supplementation of long chain omega-3 PUFAs significantly improved biomarkers of metabolic syndrome and T2D\(^5\). In addition, breast feeding with a maternal diet high in omega-3s can protect against the development of insulin resistance, T2D and hypertension, suggesting that pregnant and lactating women at risk should supplement\(^5\).

**Protein**

South Asians often consume little protein and have lower concentrations of haem iron and vitamin B12, putting them at risk of hyperhomocysteinaemia\(^5\). Protein substituted for carbohydrates can result in a reduction in WTH ratio\(^5\), while lean red meat is rich in niacin, which can improve the lipid profile, and vitamin B12, which lowers homocysteine.
Alcohol

Although alcohol consumption is not high among SAs, virtually any intake is associated with increased CV risk, rather than the regular moderate drinking which is protective in Caucasians[4,9]. Binge and spirit drinking may be particularly harmful[5]. The recommended maximum for SAs is one alcoholic drink per day for women and two per day for men, although if serum triglycerides >500mg/dL or the patient has severe liver dysfunction or hypertension, alcohol should be avoided altogether[6,7].

Smoking and chewing tobacco and betel nut

Important risk factors for SA CVD include chewing betel quid (paan, gutka), smoking regular cigarettes or bidi (thin cigarettes wrapped in brown tendu leaf) and smoking shisha (water pipe or hookah)[1,15,56,66,89]. One session of hookah smoking provides the same amount of smoke as more than 100 cigarettes and is genotoxic, carcinogenic, mutagenic and associated with hyperpneaemia[10]. The SAHFS points out that imports of smokeless tobacco from the Indian subcontinent are often not adequately labelled and are readily available, even to children, which is both illegal and highly dangerous to health[10].

Exercise

Physical inactivity is an independent CV risk factor for SAs[1,42,50,82], who generally take little exercise[15,91]. A UK study of SA women found that most were unaware that exercise was protective and guidance from health professionals was lacking[1]. For many, regular physical activity is culturally unacceptable[1] and is seen as possibly exacerbating illness and promoting physical weakness[4]. Most SAs did not feel comfortable in a Western sports centre[15]. Nevertheless, exercising is protective in SAs[12]; brisk walking for 35–40 minutes a day was associated with a >50% reduction in CHD risk[92], while physical activity improved virtually all CVD and T2D biomarkers[92,96,97]. Guidelines for SAs vary, with some recommending daily aerobic and anaerobic activity[15,71]; the NHS recommends 150 minutes of moderate-intensity aerobic exercise every week[96].

Vitamin D

Asian Indian immigrants in northern climates have lower serum 25(OH)D than Caucasians and have a tendency to develop rickets and osteomalacia; in the Netherlands over 51% of SAs were vitamin D-deficient (25(OH)D <25nmol/l)[98]. Low vitamin D concentrations are related to increased risk of T2D, affecting pancreatic insulin secretion and insulin resistance[99,100]. SAs also appear to have increased vitamin D catabolism, possibly through betel nut chewing and cigarette smoking[101,102]. However, insulin resistant SA women with serum 25(OH)D <50nmol/l given 4000IU/d or placebo for six months showed significantly improved insulin sensitivity and resistance, particularly when 25(OH)D reached >80nmol/l[99].

Conclusion

Not all health professionals may be aware of the increased SA prevalence of CVD, T2D and associated mortality, nor of the lowered thresholds for age, BMI and waist circumference. Furthermore SAs may present with atypical symptoms and without some of the conventional risk factors. It has therefore been recommended that thresholds for BMI in SAs should be revised downwards to overweight ≥23kg/m² and obese ≥25kg/m², with waist circumference threshold for men of ≥90cm. South Asians are generally poorly informed about their condition and its preventive measures and may not be aware that their disease prevalence and early onset are abnormal or that much of the prevention and management of their condition is within their own control. Moreover, cultural traditions mean that implementation of dietary and lifestyle modification is poor.

The increased risk among SAs may in large part be due to their diet and lifestyle with the high preponderance of food fried in damaging trans fats, low protective omega-3 fats, high sugar intake and little exercise. In addition, many smoke or chew paan, both strong risk factors for cancer and CVD. The radical change that is needed must come with SA community-based initiatives, in which risk factor lowering is freely discussed and the community as a whole is motivated to ensure adherence to diet and lifestyle programmes. Nevertheless, education has to start with information about their condition, an attempt to change the belief that early disease and death are inevitable and encouragement that the means for improvement via dietary and lifestyle modification are in their own hands.

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References

5. Forouhi NG, Sattar N, Tillin T, McKeigue PM, Chatuvedi N. ‘Do known risk factors explain the higher coronary heart disease mortality in South Asian compared to European men? Prospective follow-up of the Southall and Brent Studies, UK. Diabetologia. 2006; 49: 2580-6
13. Lear SA, Humphries KH, Kohil S, Chockalingam A, Frohlich JJ, Birmingham CL. ‘Visceral adipose tissue accumulation differs according to ethnic background: results of the Multicultural Community Health Assessment


76. Radhika G, Van Dam RM, Sudha V, Ganesan A, Mohan V. "Refined grain consumption and the metabolic syndrome in urban South Asians (Chennai Urban Rural Epidemiology Study 57)". Metabolism. 2009; 58(5): 675-81


80. Das UN. "Metabolic syndrome X is common in South Asians, but why and how?". Nutrition. 2002; 18(9): 774-6


97. ‘Promoting physical activity among South Asian women with coronary heart disease and diabetes: what might help?’.