

A Brown Paper: The Health of South Asians in the United States



The *Brown Paper* is a groundbreaking compendium and review of health research and literature on South Asians in the United States. Published in 2002, the *Brown Paper* evaluates and summarizes existing knowledge about key health indicators for South Asian Americans.

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Cardiovascular Disease

*Susan L. Ivey, MD, MHSA, Meenakshi Khatta, MS, CRNP,
Rajesh Vedanthan, MS, MPH, MD*

Objectives: The authors reviewed available literature on South Asian cardiovascular health in the US and other countries to report on cardiovascular disparities and health concerns.

Key Findings: Asian Indian populations appear to be at high risk for heart disease compared with other ethnic groups (nearly three times the rate was seen in the US dwelling physicians compared with the Framingham offspring study). Some research demonstrates high rates of cardiovascular disease among other South Asian groups, although the data is sparser. Specific lipid abnormalities as well as high rates of an endocrine problem known as metabolic syndrome are part of the picture, but diet, physical activity, tobacco use, and stress mechanisms need to also be elucidated.

Recommendations: Research specific to South Asian populations living in the US needs to be conducted. Prevention strategies, including recommendations on screening, dietary modification, physical activity, and treatment modalities, need to be tested and implemented to reduce the high rates of heart disease in this population.

Introduction

Cardiovascular disease (CVD) is the primary cause of mortality among Asian Indians in the US. Most of the available published research on CVD among South Asians has been conducted in countries other than the United States.^{1,2,3} Those studies that have been done in the US have investigated almost exclusively persons of Asian Indian descent, or have assessed a specific type of risk such as lipid status or fasting insulin status.⁴ For the purposes of this review the focus is primarily on Asian Indians due to the paucity of data among other South Asian groups. Where data are available on groups from specific geographic origins, the group's country of origin is noted. Available data from the United Kingdom (UK) do demonstrate differences in disease rates and risk factors among

¹ Begom R, Singh R. Prevalence of coronary artery disease and risk factors in an urban population of south and north India. *Acta Cardiologia*. 1995;3:227-240.

² Collins V, Dowse G, Cabaalawa S, Ram P, Zimmet P. High mortality from cardiovascular disease and analysis of risk factors in Indian and Melanesian Fijians. *International Journal of Epidemiology*. 1996; 25:59-69.

³ Tuomilehto J, Ram P, Eseroma R, Taylor R, Zimmet P. Cardiovascular diseases and diabetes mellitus in Fiji: Analysis of mortality, morbidity and risk factors. *Bulletin of the World Health Organization*. 1984;62: 133-143.

⁴ Anand S, Enas E, Pogue J, Haffner S, Pearson T, Yusuf S. Elevated lipoprotein (a) levels in South Asians in North America. *Metabolism*. 1998;47:182-184.



various South Asian groups living in Great Britain,^{5,6} so it cannot be assumed that all South Asians have similar risks for cardiovascular diseases.

National level surveys are currently inadequate for assessing risks for health status in specific Asian subpopulations either due to the aggregation of multiple ethnic groups into the socially constructed category Asian American and Pacific Islander (AAPI) or due to small sample sizes. Similarly, state Behavioral Risk Factor Surveillance Systems (BRFSS) often do not obtain information on specific AAPI subpopulations. Population-based surveys of South Asians living in the US have not been conducted with sufficient rigor to provide generalizable data about coronary heart disease risk factors.

Little is known about overall health status, health-related behaviors such as diet and physical activity, and access to and use of health care services within the South Asian community living in the US. First generation Asian Indian immigrants to the US have a much higher prevalence (percentage of cases in the population) of cardiovascular diseases compared with other Asian populations and non-Hispanic Whites.⁷ In the only published study examining this, 1,688 Asian Indian physicians and their family members (n=1,131 men and N=557 women) were studied. The age-adjusted prevalence of myocardial infarction of angina among Asian Indian male physicians was 7.2% compared with 2.5% in the Framingham Offspring Study, a longitudinal study of Caucasian residents of Framingham, Massachusetts. Rates were similar between Asian Indian women and the women from the Framingham study.⁷

It is unclear whether all South Asians living in the US are at higher risk for coronary heart disease, although studies in the UK, which have been included other South Asians, such as Bangladeshi and Pakistanis, indicate other South Asians also have higher than average cardiovascular risks.^{5,6,8,9,10} Heart disease is the leading cause of death for Asian Indians aged 54-64 years, with 38.7% of all deaths among Asian Indians attributable to diseases of the heart.¹¹ This source, drawn from National Center for Health Statistics

⁵ Bhopal R, Unwin N, White M, Yallop J, Walker L, Alberti K, Harland J, Patel S, Ahmed N, Tumer K, Watson B, Kaur D, Kulkarni A, Laker M, Tavridou A. Heterogeneity of coronary heart disease risk factors in Indian, Pakistani, Bangladeshi, and European origin populations: cross sectional study. *BMJ*. 1999;319:215-220.

⁶ Nazroo JY. South Asian people and heart disease: an assessment of the importance of socioeconomic position. *Ethnicity and Disease*. 2001; 11: 401-411.

⁷ Enas E, Garg A, Davidson M, Nair V, Huet B, Yusuf S. Coronary heart disease and its risk factors in first-generation immigrant Asian Indians to the United States of America. *Indian Heart Journal*. 1996;48:343-353.

⁸ McKeighue PM, Marmot MG, Syndercombe CYD, Cattier DE, Rahman S, Riemersma RA. Diabetes, hyperinsulinemia, and coronary risk factors in Bangladeshi in East London. *British Heart Journal*. 1988; 60:390-396.

⁹ Balarajan R. Ethnic differences in mortality from ischaemic heart disease and cerebrovascular disease in England and Wales. *BMJ*. 1991;302:560-564.

¹⁰ McKeigue PM, Ferrie JE, Pierpoint T, Marmot MG. Association of early-onset coronary heart disease in South Asian men with glucose intolerance and hyperinsulinemia. *Circulation*. 1993;87:152-161.

¹¹ Hoyert D, Kung HC. Asian or Pacific Islander Mortality, selected states, 1992. *Monthly Vital Statistics Report*. 1997;46(1 Suppl): 1-64.



(NCHS) mortality data, does not list mortality data on any other South Asian population. One study of six ethnic groups in California, using death certificate data from 1985 to 1990, found that while all cause mortality was lowest for Asian Indians, age-standardized death rates for coronary heart disease (CHD) were similar to several other ethnic groups (258 deaths per 100,000 in *Asian Indian men* compared with 280 for *all men*, and 110 per 100,000 in *Asian Indian women* compared with 139 per 100,000 in *all women*). While persons of Bangladeshi, Pakistani, and Sri Lankan origins are identified on the death tapes used for this study and were included by the author, the Census data the author used included only Asian Indians in the denominator (which could make standardized mortality rates higher than the true rate). Age-specific proportional mortality rates of coronary heart disease among Asian Indians were higher, however, than for any other group studied.¹²

Other researchers have shown that standardized mortality ratios for CHD are consistently higher among migrant Asian Indians compared with other populations.¹³ Age-adjusted stroke death rates among California dwelling Asian Indians were slightly lower than the overall state stroke death rates in 1990¹⁴ (21.2 deaths per 100,000 population, compared with 28.8 deaths per 100,000 for California's overall population). This finding is similar to Wild's analysis of stroke deaths from 1985 to 1990 which showed the standardized mortality rates and age-adjusted death rates from stroke were highest for African-American, lower for White, and lowest for Asian Indian (compared with five other ethnic groups studied).¹² While little appears on vascular diseases outside of the heart disease among South Asians, many authors have suggested that atherosclerotic processes ("hardening of the arteries") are accelerated,¹³ that function of the lining of arteries is more likely to be abnormal even health Asian Indians,²⁷ and that such endothelial dysfunction may contribute to vascular disease processes including CHD.

In addition to the lack of data on death rates and disease prevalence, there is little information about how programs can best address health promotion and chronic disease prevention to improve health. Similarly, there is minimal information on how to tailor cardiovascular prevention interventions to the unique languages, cultures, and histories of South Asians. Recommendations on dietary and lifestyle modification for Asian Indians have focused on reductions in use of saturated fats, ensuring regular exercise, and decreasing caloric and carbohydrate consumption.¹⁵ However, design of culturally tailored interventions for the larger South Asian community and testing of such recommendations have not appeared in the literature.

¹² Wild S, Laws A, Fortmann S, Varady A, Byrne C. Mortality from coronary heart disease and stroke for six ethnic groups in California, 1985 to 1990. *Annals of Epidemiology*. 1995;5:432-439.

¹³ Enas EA, Mehta J. Malignant coronary artery disease in young Asian Indians: thoughts on pathogenesis, prevention and therapy. *Clinical Cardiology*. 1995;18:131-135.

¹⁴ California Department of Health Services. Death Statistical File, 1990. Table 12 (Age adjusted death rates for stroke). Page 45. Sacramento, CA: Department of Health Services.

¹⁵ Enas E, Yusuf S, Mehta J. Prevalence of Coronary artery disease in Asian Indians. *The American Journal of Cardiology*. 1992;70:945-949.



Risk Factor Epidemiology among South Asians

Asian Indian migrants, as a group, appear to be at risk for CHD despite the relatively healthy lifestyles reported in Enas' Asian Indian physician study.¹⁶ Pakistani and Bangladeshi migrants to the UK also have high rates of CHD, while risk factor profiles differ. One UK study on risk factors found that Indians were the most physically active, Pakistani and Bangladeshi persons were less likely to drink alcohol, Bangladeshi men were more likely to be smokers, and Pakistani and Indian men ate more fruits and vegetables daily.⁵ Another UK study indicated higher rates of self-reported ischemic heart disease among Pakistanis and Bangladeshis as compared with Asian Indians, and suggested that some of this increase was related to difference in socioeconomic position.⁶ One study from Canada found that South Asians (including Asian Indian, Pakistani, Sri Lankan, and Bangladeshi) have a higher prevalence of cardiovascular disease, but neither the morbidity statistics nor the risk factor profiles were delineated by specific South Asian subpopulation.¹⁷ In contrast, there is very little information on risk factors among South Asians in US studies.

Coronary heart disease is prevalent among Asian Indians despite fewer traditional risk factors, such as tobacco use, hypercholesterolemia (high cholesterol or other abnormal fats in the bloodstream), high blood pressure, high dietary fat intake, low physical activity levels, and family history. The combination of genetic predisposition and broad changes accompanying Westernization could help explain this high risk. In Enas' study, many persons were vegetarian; in one survey, physical activity was far above the US average,¹⁸ and smoking was comparatively low.¹⁵ However, there is speculation that diets high in tropical oils are common and it is known that some of these oils are very high in saturated fatty acids.¹⁹ A combination of diets high in tropical oils with diets high in use of butter and ghee (clarified butter) could potentially cause atherosclerosis.

Lipid Abnormalities

Lipid, or fat, abnormalities contribute to the high rate of CHD among South Asians. These abnormalities include low levels of high-density lipoprotein (HDL) cholesterol, high levels of low-density lipoprotein (LDL), elevated triglyceride and lipoprotein (a)

¹⁶ Enas E. High rates of CAD in Asian Indians in the United States despite intense modification of lifestyle: What next? *Current Science*. 1998a;74:1081-1086.

¹⁷ Anand SS, Yusuf S, Vuksan V, Devanese S, Koon KK, Montague PA, Kelemen L, Yi C, Lonni E, Gerstein H, Gegele RA, McQueen M. Differences in risk factors, atherosclerosis, and cardiovascular disease between ethnic groups in Canada: the study of health assessment and risk in ethnic groups (SHARE). *The Lancet*. 2000;356: 279-284.

¹⁸ Yagalla M, Hoerr S, Song W, Enas E, Garg A. Relationship of diet, abdominal obesity, and physical activity to plasma lipoprotein levels in Asian Indian physicians residing in the United States. *Journal of the American Dietetic Association*. 1996;96:257-261.

¹⁹ Enas E. Management of Coronary Risk Factors: Role of lifestyle modification. *Cardiology Today*. 1998b;2:17-26.

levels, and insulin resistance.^{14,20,21} Insulin resistance syndrome, which consists of high insulin, abnormal lipids, and visceral (“apple-type”) obesity, is more prevalent among Asian Indians living in the UK.¹⁰ This syndrome contributes to diabetes mellitus (specifically, the non-insulin dependent form of diabetes). Lipoprotein (a), a small fat particle, is also the most powerful independent risk factor for the occurrence and reoccurrence of myocardial infarction and early death in men under 45.²² In a study of 1,150 subjects from seven ethnic groups in several countries, mean lipoprotein (a) levels among Asian Indians in Singapore were two times higher than those of all other ethnic groups, with the exception of Black Sudanese persons. Effects of high lipoprotein (a) are magnified in the presence of high LDL (the “bad” cholesterol), or high total cholesterol (TC) to HDL ratio (TC/HDL).²³ Genetic research on lipid disorders represents another key area for designing methods for risk modification, including potential pharmaceutical intervention. Evaluation of specific interventions with statins or other lipid modifying drugs are needed, and some of these are in progress.¹⁶

Two relevant candidate genes involved in the regulation of HDL cholesterol and triglyceride metabolism are the APOA1 and APOC3 genes. APOA1 encodes apolipoprotein A-1, which plays an integral role in reverse cholesterol transport.²⁴ Under-expression of APOA1 leads to diminished reverse cholesterol transport, which would increase CHD risk. Over-expression of APOC3 results in high triglycerides and lower HDL cholesterol,²⁵ both of which increase the risk of CHD.

To evaluate a potential molecular link between the hyper-insulinemia and the abnormal lipid profile often observed in Asian Indians, researchers at the University of Maryland Medical System studied two known gene polymorphisms, T-455C and C-482T, within the insulin response element of the APOC3 promoter. A promoter is part of a gene that is involved in its regulation for a specific function. A response element in this case is a site on the promoter that is involved in metabolic regulation of insulin.

The prevalence of both the T-455C and C-482T polymorphism was evaluated in 99 Asian Indians (mean age 45.5 ± 12.3 years, 69% men). The APOC3 promoter polymorphisms (T-455C and C-482T) were frequently encountered in young Asian Indians, especially in

²⁰ Mohan V, Deepa R, Rani SS, Premalatha G. Prevalence of coronary artery disease and its relationship to lipids in a selected population in South India. *Journal of the American College of Cardiology*. 2001; 38: 682-687.

²¹ Enas EA. Lipoprotein (a) is an important genetic risk factor for coronary artery disease in Asian Indians. *American Journal of Cardiology*. 2001; 88: 201-202.

²² Sandkamp M, Assman G. Lipoprotein (a) in PROCAM participants and young myocardial infarction survivors. IN: Scanu AM, Ed. *Lipoprotein (a)*. New York, NY: Academic Press; 1990:205-209.

²³ Sandholzer C, Hallman DM, Saha N, Sigurdsson G and Csaszar A. Effect of apolipoprotein (a) polymorphism on the lipoprotein (a) concentration in seven ethnic groups. *Human Genetics*. 1991;86:607-614.

²⁴ Colvin PL, Parks JS. Metabolism of high density lipoprotein subfractions. *Current Opinions in Lipidology*. 1999;10:309-314.

²⁵ Fredenrich A. Role of apolipoprotein CIII in triglyceride-rich lipoprotein metabolism. *Diabetes Metabolism*. 1998;24:490-495.



those with a family history of premature coronary heart disease. This polymorphic region has been associated with the loss of insulin down-regulation and dyslipidemia.²⁶

Other Biological Factors

While lipids, and lipoprotein (a) in particular, appear to be specific risk factors among Asian Indians, other recent research has focused on abnormalities of the lining of the blood vessels (vascular endothelial function) among even health Asian Indian men²⁷ and elevated serum homocysteine, among other metabolic abnormalities.^{28,29} The SHARE study in Canada demonstrated that South Asians' excess cardiovascular disease prevalence could be partially attributable to elevated levels of plasminogen activator inhibitor-1 (PAI-1) in addition to elevated lipoprotein (a).¹⁷ Also, a study in the UK found that elevated levels of C-reactive protein (CRP) were associated with risk factors for cardiovascular disease, although this study did not study CVD directly.³⁰ These studies may need to be replicated in US dwelling persons of South Asian descent and particularly in women. Each of these abnormalities suggests new potential intervention strategies, such as folate or vitamin B-12 supplementation for high homocysteine, that need to be examined.³¹

Diet, Body Habitus, and Risk for Metabolic Syndrome (Insulin Resistance Syndrome)

Dietary intake cannot be assumed to be similar among all Asian subpopulations or even among South Asians migrating from different countries or regions. Asian Indian men who had immigrated to the US at least 10 years earlier had low mean body mass indexes (BMIs) compared with Americans but still were at risk for elevated triglycerides (another fat in the body) and total cholesterol, whether vegetarian or non-vegetarian.¹⁸ Definitive dietary differences, which persist post-migration, have been demonstrated in studies of different religious groups from South Asia.³¹ Existing diet instruments must be modified to reflect foods commonly eaten in South Asian cultures,¹⁸ to allow for comparisons

²⁶ Miller M, Rhyne J, Khatta M, Parekh H, Zeller K. Prevalence of APOC3 promoter polymorphisms T-455C and C-482T in Asian-Indians. A presentation for American Heart Association (AHA). Atlanta, GA: AHA, November 1999.

²⁷ Chambers J, McGregor A, Jean-Marie J, Kooner J. Abnormalities of vascular endothelial function may contribute to increased coronary heart disease risk in UK Indian Asians. *Heart*. 1999;81:501-504.

²⁸ Chambers J, Obeid O, Refsum H, Ueland P, Hackett D, Hooper J, Turner RM, Thompson SG, Kooner JS. Plasma Homocysteine concentrations and risk of cardiovascular disease in UK Indian Asian and European men. *The Lancet*. 2000; 335:523-527.

²⁹ Anand SS, Yusuf S, Vuksan V, Devanesen S, Montague P, Kelemen L, Bosch J, Sigouin C, Teo KK, Lonn E, Gerstein HC, Hegele RA, McQueen M. The study of health assessment and risk in ethnic groups (SHARE): rationale and design. The SHARE investigators. *Canadian Journal of Cardiology*. 1998;14:1349-1357.

³⁰ Chambers JC, Eda S, Bassett P, Karim Y, Thompson SG, Gallimore JR, Pepys MB, Kooner JS. C-Reactive Protein, insulin resistance, central obesity, and coronary heart disease risk in Indian Asians from the United Kingdom compared with European Whites. *Circulation*. 2001; 104: 145-150.

³¹ Maxwell J, Strachan D. Risk of coronary heart disease in Hindus and Muslims from Indian subcontinent is similar. *BMJ*. 1996; 313:563.



between men and women, and to specifically compare dietary intake among recent immigrants with more acculturated migrants to the US and with second (and later) generation persons. Specific nutritional components such as folic acid and Vitamin B-12, along with other micronutrients, must be assessed by accurate collection of dietary information across all of those groups.

Asian Indians have been noted in other studies to have higher rates of insulin resistance and central obesity (obesity around the center of the body), although these studies have generally been conducted in other countries.^{5,32,33,34} Asian Indians also have been shown in at least one study to have a higher percent of body fat at normal BMI³⁴ and to have higher coinicity (central fat distribution) at the same BMI as comparison groups.³⁴ In Bhopal's study of South Asian migrants to the UK, obesity was more common among Indian and Pakistani persons. Obesity was more common among Indian and Pakistani women compared with Bangladeshi women.⁵ High waist to hip ratios were more common among Pakistani and Bangladeshi women and about four times more common in South Asians than in people of European origin in that study. Waist circumference is associated with lipid disorders, Type 2 diabetes, and hypertension across many ethnic groups.³⁵ High central obesity is a key risk association of the metabolic syndrome, also called Syndrome X or insulin resistance syndrome. Metabolic syndrome is a marker of risk for both future diabetes and future ischemic heart disease.³⁶ Diabetes has been shown to be elevated in a number studies of South Asians.^{7,10,32,37} In addition, a recent study in the UK showed that South Asian children of normal weight were more likely to be insulin resistant than a comparison group of Caucasian children³⁸ (see Diabetes chapter).

High birth weight and low birth weight are risk factors for diabetes and have been associated in some studies with obesity later in life. Low birth weight has also been shown to be associated with high rates of CHD in other populations.^{39,40} Studies have

³² Whitty C, Brunner E, Shipley M, Hemingway H, Marmot M. Differences in biologic risk factors for cardiovascular disease between three ethnic groups in the Whitehall II study. *Atherosclerosis*. 1999; 142: 279-286.

³³ Banerji MA, Faridi N, Atluri R, Chaiken RL, Lebovitz HE. Body composition, visceral fat, leptin, and insulin resistance in Asian Indian men. *Journal of Clinical Endocrinology and Metabolism*. 1999; 84: 137-144.

³⁴ Gishen FS, Hough LM, Stock MJ. Differences in conicity in young adults of European and South Asian descent. *International Journal of Obesity and related Metabolic Disorders*. 1995; 19: 146-148.

³⁵ Oksun I, Liao Y, Rotimi C, Choi S, Cooper R. Predictive values of waist circumference for dyslipidemia type 2 diabetes and hypertension in overweight White, Black, and Hispanic American Adults. *Journal of Clinical Epidemiology*. 2000; 53: 401-408.

³⁶ Reaven GM. Syndrome X: 6 Years later. *Journal of Internal Medicine*. 1994; 236 (suppl 736): 3-22.

³⁷ Sheth T, Nair C, Nargundkar M, Anand S, Yusuf S. Cardiovascular and cancer mortality among Canadians of Europeans, South Asian and Chinese origin from 1979 to 1993; An analysis of 1.2 million deaths. *CMAJ*. 1999; 161: 132-138.

³⁸ Whincup P, Gilg J, Papcosta O, Seymour C, Miller G, Alberti K, Cook D. Early Evidence of ethnic differences in cardiovascular risk: cross-sectional comparison of British South Asian and White children. *BMJ*. 2002; 324: 1-6.

³⁹ Fall C, Osmond C, Barker D, Clark P, Hales C, Stirling Y, Meade T. Fetal and infant growth and cardiovascular risk factors in women. *BMJ*. 2001; 310: 428-432



also shown that low birth weight is more common among Asian Indians in several countries, including the US.^{41,42} Extensive research on fetal origins of metabolic syndrome and non-insulin dependent diabetes is taking place in Great Britain, the United States and in Pune, India. New research on body habitus, or shape, among US dwelling Asian Indians in progress.⁴³

Tobacco Use

Tobacco use among Asian Indians living in the US appears to be lower than for other Asian Americans (8.7% reported smoking).⁴⁴ Due to small sample sizes in the National Health Interview Survey (NHIS), producing these statistics requires aggregating three years of NHIS data and the collective sample size still does not allow for additional analysis to compare rates between males and females. A recent survey of South Asians in Northern California showed 12% of respondents had ever smoked.⁴⁵ However, according to personal communication with California medical providers, recent immigrants from Asian countries are sometimes adopting smoking as they assimilate, so it remains important to monitor tobacco use in this group.

Asian American youth may also be smoking more than their parents, based on conversations that overall tobacco use among Asian American and Pacific Islander women is often higher in the US than in the native countries from which those persons immigrated.^{46,47} In particular, a recent trend has been observed among US youth, including youth descended from India and its Diaspora communities, to smoke small, flavored, hand-rolled cigarettes known as beedies or bidi.⁴⁸ The CDC also incorporated a question on bidi use into the 2001 Behavioral Risk Factor Survey.

⁴⁰ Eriksson J, Forsen T, Tuomilehto J, Osmond C, Barker D. Early growth and coronary heart disease in later life: longitudinal study. *BMJ*. 2001; 332: 949-953.

⁴¹ Fuentes-Afflick E, Hessol NA. Impact of Asian ethnicity and national origin on infant birth weight. *American Journal of Epidemiology*, 1997; 145: 148-155.

⁴² Yajnik CS, Fall CH, Vaidya U, Pandit AN, Bavdekar A, Bhat DS, Osmond C, Hales CN, Barker DJ. Fetal growth and glucose and insulin metabolism in four year-old Indian children. *Diabetic Medicine*. 1995; 12: 330-336.

⁴³ Palaniappan L, Anthony MN, Mahesh C, Elliott M, Kileen A, Giacherio D, Rubenfire M. Cardiovascular risk factors in ethnic minority women aged < or = 30 years. *Am J Cardiology*. 2002; 89: 524-529.

⁴⁴ Kuo J, Porter K. Health status of Asian Americans: United States, 1992-94. *Advance Data*. 1998; 298: 1-13.

⁴⁵ Ivey S. Personal communication. Cardiovascular risk factors among South Asians. A projected funded by the Centers for Disease Control and Prevention, Atlanta, GA; 2002.

⁴⁶ Chen A, Meng YY, Kunwar P, Suh D, Bau I, Tom H, Kuramoto F, Ng P, Sam P, Choi C, Fong K, Louie R, Lew R, Lai KQ, Huen F, Saika P. The health status of Asian and Pacific Islander Americans in California. Woodland Hills, CA: The California Endowment and California Health Care Foundation; 1997.

⁴⁷ Burns D, Piece JP. Tobacco use in California, 1990-1991. Sacramento, CA: Department of Health Services; 1991.

⁴⁸ Centers for Disease Control and Prevention (CDC). Bidi Use Among Urban Youth – Massachusetts, March-April, 1999. Available at: http://www.cdc.gov/tobacco/research_data/youth/mmw999fs.htm. Atlanta, GA: CDC; 2000.



Does Acculturation Predict CHD risk?

Higher rates of CHD are seen in Asian Indian migrants in a number of environments (Canada, UK, Fiji, and Mauritius), almost regardless of where those migrants settle.^{2,37,49} One very significant finding in the SHARE study from Canada was that, after taking into account traditional and novel biological risk factors for CVD, “South Asian ethnicity” itself remained a strong and independent predictor CVD.¹⁷ As with any group undergoing a migration process, South Asian migrants may undergo acculturation stress, but acculturation may impact cardiovascular risks among different groups in different ways. Japanese men show decreasing rates of hypertension upon migration but higher rates of coronary heart disease.⁵⁰ The differences cannot be accounted for entirely with traditional risk factors such as smoking or serum cholesterol,⁵¹ raising questions that social and cultural factors may also contribute to CHD risks in this immigrant group in the US.

Similarly, Mexican immigrants, but not Cuban immigrants, have increasing rates of obesity with acculturation.⁵² There are a number of life stressors that occur among recent immigrants to the US which are not unique to migration to America.^{53, 54} The impact of post-migration stress on the cardiovascular system is relatively unstudied. Some diabetes researchers have called the initial post-migration period the upward curve of assimilation, representing adoption of behaviors that may increase risk factors for CHD and diabetes as groups assimilate.⁵⁵

At a minimum, the risks of rapid assimilation could include adopting smoking/tobacco use, adopting dietary changes that promote the intake of highly processed, high sodium, and high fat food products, and diminishing levels of physical activity. On the other hand, there is a downward slope of post-migration stress as well, during which groups who have prospered post-migration begin to adopt healthier behaviors such as exercise and use of preventive medical services, which may also have a role in reducing CHD risks. Use of health services by immigrants begins to approximate the native US population

⁴⁹ Hodge Am, Dowse GK, Collins VR, Alberti KG, Gareeboo H, Tuomilehto J, Zimmet P. Abdominal fat distribution and insulin levels only partially explain adverse cardiovascular risk profile in Asian Indians. *Journal of Cardiovascular Risk*. 1996; 3: 263-270.

⁵⁰ Kagan A, Harris B, Winkelstein W, Johnson K, Kato H, Syme SL, Rhoads G, Gay M, Nichaman M, Hamilton H, Tillotson J. Epidemiologic Studies of coronary heart disease and stroke in Japanese Men living in Japan, Hawaii, and California; demographic, physical, dietary and biochemical characteristics. *Journal of Chronic Diseases*. 1974; 27: 345-363.

⁵¹ Marmot M, Syme SL. Acculturation and Coronary Heart Disease in Japanese-Americans. *American Journal of Epidemiology*. 1976; 104: 225-247.

⁵² Khan LK, Sobal J, Martorell R. Acculturation, socio-economic status, and obesity in Mexican-Americans, Cuban Americans, and Puerto Ricans. *International Journal of Obesity and Related Metabolic Disorders*. 1997; 21: 91-96.

⁵³ Sluzki C. Migration and family conflict. *Family Process*. 1979; 379-390.

⁵⁴ Boyd M. Family and Personal Networks in International Migration: Recent Developments and New Agendas. *International Migration Review*. 1989; 23: 638-670.

⁵⁵ Carter JS, Pugh JA, Monterossa A. Non-insulin-dependent diabetes mellitus in minorities in the United States. *Annals of Internal Medicine*. 1996; 125: 221-232.



after about 10 years of residency in the US.⁵⁶ It is not clear where the present American population of South Asian origin falls on these acculturation curves, as earlier waves of immigrants were often better-educated than most recent waves.⁵⁷ Another factor of interest is environmental and occupational stress and whether coping varies among assimilated and less assimilated immigrants. In a Whitehall II study of psychosocial factors in heart disease, South Asians described higher depression, lower job control, and lower social support at work compared with Caucasians or Afro-Caribbeans.⁵⁸ It has been shown that Asian Indian immigrants vary from persons in the country of origin in specific beliefs that relate to stress and coping.⁵⁹ Qualitative research conducted in preparation for the survey portion of Cardiovascular Risk Factors among South Asians revealed that not all persons even related to the word “stress” but preferred the terms “pressures” or “tensions.”⁴⁵

It remains unknown whether cardioprotective factors occur among immigrants who assimilate more slowly or among those who live in an agricultural-based economy as compared with persons migrating here to assume professional positions. Concepts of life stressors, discrimination, and coping can be measured across groups to assess differences that may exist⁶⁰ in order to determine if such differences help explain the known linkages between CHD and acculturation. Instruments measuring these concepts must be modified for specific ethnic groups. Research into biochemical pathways that might explain how stress impacts CHD risks is ongoing. Some researchers hypothesize that allostatic load, the chronic excitation of neurohormonal pathways via the hypothalamic-pituitary axis,⁶¹ increases central obesity and thus, might elevate risk for metabolic syndrome.

Screening and Treatment Recommendations

While the higher rate of CHD among South Asians is fairly well established, screening and treatment recommendations do not reflect this higher risk. Health providers need information on which to base recommendations for earlier screening (lipid and glucose abnormality testing) and on interventions that promise to address those risk factors that are modifiable. At a minimum, it seems prudent to screen patients with family histories of early onset heart disease, to treat lipid abnormalities when detected by advising

⁵⁶ LeClere F, Jensen L, Biddlecom A. Health care utilization, family context, and adaptation to a new culture: the case of Indian immigrants. *Journal of the Indian Academy of Applied Psychology*. 1996; 22: 55-64.

⁵⁷ Prashad V. *The Karma of Brown Folk*. Minneapolis, MN: University of Minnesota Press; 2000.

⁵⁸ Hemingway H, Whitty CJM, Shipley M, Stansfeld S, Brunner E, Fuhrer R, Marmot M. Psychosocial risk factors for coronary disease in White, South Asian and Afro-Caribbean civil servants: the Whitehall II Study. *Ethnicity and Disease*. 2001; 11: 391-400.

⁵⁹ Vohra SS, Broots KD. Beliefs and adaptation to a new culture: the case of Indian immigrants. *Journal of the Indian Academy of Applied Psychology*. 1996; 22: 55-64.

⁶⁰ Lam D, Palsane M. Research on stress and coping: contemporary Asian approaches. In: Henry SRK, Durganand S, Eds. *Asian Perspectives on Psychology*. New Delhi, India: Sage Publications; 1997: 265-281.

⁶¹ McEwen BS. Protective and damaging effects of stress mediators. *New England Journal of Medicine*. 1998; 338: 171-179.



therapeutic lifestyle change (TLC), including dietary changes (such as substituting canola oil for more saturated fats), and regular physical activity. Recommendations on the best pharmaceutical approach for non-responders to lifestyle intervention can be found in recent reviews such as the National Cholesterol Education program's ATP-III recommendations.⁶² If lifestyle changes are not effective in lipid profile modification after three months, the addition of a therapeutic agent may be considered if the patient has multiple risk factors. Generally, statin drugs have shown to be the most effective in lowering cholesterol and LDL. Some authors have recommended this group of drugs be used as first line therapy in patients with elevated cholesterol levels, particularly for elevated LDL.^{62,63}

Treatment should be tailored for each patient. No randomized controlled trials have compared with different lipid lowering agents for treatment of lipid disorders among Asian Indians but some authors believe that niacin is very effective at lowering lipoprotein (a)⁶³ and gemfibrozil (alone or in combination with niacin)⁶⁴ may be useful in modifying low HDL. Physical activity increases may raise HDL and improve insulin metabolism.

Once adequate baseline health information is available on the South Asian people in the US, prevention and treatment intervention trials can be undertaken for outcomes. Rigorous intervention evaluation will allow recommendations to be issued for primary prevention, screening for risks, and early treatment of affected individuals.

As one of the four groups most impacted by cardiovascular diseases in the world, and as one of the most rapidly increasing groups of Asian American immigrants to the US, the cardiovascular status of South Asians is ignored at great cost, both in terms of lives lost and in costs to the health system that are potentially avoidable with earlier screening and intervention.

Recommendations of Researchers

- Collect additional baseline data using population-based surveys on the current health status of Asian Indians and other South Asians living in the US, including an assessment of traditional and novel CHD risk factors.
- Tailor instruments so that they are culturally relevant to collect the best information possible in the areas of diet, physical activity, and tobacco usage, among others. In addition, the best information will be yielded if surveys are conducted in the most common South Asian languages in order to prevent the bias introduced when only the most acculturated and educated segment of the South Asian community is surveyed using an English-only instrument. An English-only

⁶² National Cholesterol Education Program. ATP-III report; 2001. Available at: <http://www.nhlbi.nih.gov/guidelines/cholesterol/>. Accessed August 4, 2002.

⁶³ Enas E. Prevention and Treatment of coronary artery disease. *JAPI*. 1997; 45: 309-315.

⁶⁴ Spencer G, Wirebaugh S, Whitney E. Effect of a combination of gemfibrozil and niacin on lipid levels. *Journal of Clinical Pharmacology*. 1996; 36: 696-700.



bias contributes to the “model minority” stereotypes that continue to plague health policy advocacy efforts for Asian American and Pacific Islander communities in general and the South Asian community in particular.

About the Authors

Susan L. Ivey, MD, MHSA

sliveymd@socrates.berkeley.edu

Dr. Ivey is a family physician engaged in prevention research with a focus on disparities in health, particularly in immigrant communities. She is currently conducting a study of cardiovascular risks among Asian Indians in communities in California.

Meenakshi Khatta, MS, CRNP

mkhatta@medicine.umaryland.edu

Ms. Khatta is a cardiology Nurse Practitioner at University of Maryland Medical System. Her interests include the prevention of cardiovascular diseases among South Asians.

Rajesh Vedanthan, MD, MPH, MS

Rajesh_vedanthan@alum.swarthmore.edu

Dr. Vedanthan recently received his MD from the University of California, San Francisco, School of Medicine; his residency in Internal Medicine is at Brigham and Women’s Hospital in Boston, MA. He is a co-founder of the Swastihya Community Health Partnership in Sringeri, India.

Acknowledgements

The authors appreciate the assistance of Kurn Greenlunk, PhD, and Latha Palaniappan, MD, and Dr. Michael Miller for reading over earlier drafts of the paper. The authors would also like to thank Mahesh Krishan, MD and an anonymous reviewer who read the chapter for technical accuracy and Dr. Amita Vyas and Vidhya Setty for their editing assistance.