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Guidelines

Cardiometabolic-Renal Disease in South Asians: Consensus Recommendations from the Cardio Renal Society of America

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Abstract

Background: Rates of cardiometabolic-renal disease are extremely high among South Asians (India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives, and Nepal) residing in their home countries and worldwide. The Cardio Renal Society of America, National Kidney Foundation of Arizona, and Twinepidemic Inc. convened a task force to examine evidence and reach consensus regarding cardiometabolic-renal disease prevention in South Asians. The task force distilled the findings from 5 years of face-to-face and virtual meetings addressing questions derived from expert reviews of published data using the Delphi technique to create these consensus statements. ***Summary:*** Several high-quality observational studies document the high and increasing incidence and prevalence of cardiometabolic-renal disease among South Asians, starting well before adulthood, owing to genetic, cultural, and environmental factors. Despite the need for additional prospective studies, especially randomized trials, of educational, screening, and other prevention efforts, sufficient information is already avail-

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Krishnaswami Vijayaraghavan is president of Twinepidemic, Inc. (www.twinepidemic.com), a non-profit organization.
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able to expand and intensify ongoing efforts in professional and lay education to help control this epidemic. The task force proposes to provide this expansion over the next 10 years through scientific and lay publications and other educational programs to promote more effective action among the public, health care professionals, payers, and regulators in screening for and treating cardiometabolic-renal risk factors and preventing disease in South Asians, starting at an early age. ***Key Messages:*** These consensus statements describe risk factors and prognoses characteristic of South Asians regarding cardiometabolic-renal diseases, to aid physician decision-making, health care system delivery, and research initiatives to improve the quality of care for South Asians worldwide.

Introduction

South Asians – people of Indian, Pakistani, Bangladeshi, Bhutanese, Sri Lankan, Maldivian, or Nepalese descent – compose 25% of the global population, yet contribute 60% of the global cardiovascular disease (CVD) burden. Close to 4 million South Asians live in North America alone, including 2.84 million in the United States [1], meaning that health problems among South Asians are important issues in the United States. Cardiometabolic-renal disease involves a complex interaction between pathogenic factors of CVD, diabetes mellitus type 2 (DM2), and renal disease [2]. Lipid abnormalities, as well as insulin resistance and comorbid DM2, appear to be the major causes of the increased risk of renal disease and CVD in South Asians [3]. South Asians already have an approximately 2- to 4-fold higher prevalence of DM2 than other racial/ethnic groups, and this prevalence is growing rapidly. Worldwide, the prevalence of DM2 is growing, from 171 million in 2000 to a projected 366 million in 2030, and this increase is expected to be mirrored in the Indian subcontinent and among all South Asians [4].

The risk of microvascular complications among South Asians with DM2 tends to be similar to that in Caucasian populations; however, atherosclerotic CVD (ASCVD) is significantly more prevalent among South Asians, and it manifests at a younger age in the nonobese South Asian populations. The World Health Organization found that in 1990 the proportion of CVD-related deaths occurring before 70 years of age was 26% in developing countries but 52% in India [5]. Additionally, chronic kidney disease (CKD) is also common in South Asian populations [6], although relevant information about the epidemiology, natural history, and unique pathophysiology is limited.

Patients and physicians alike often fail to realize the far-reaching impact of DM2-related complications, especially in the context of the South Asian diaspora, in which the lack of understanding and awareness of key differences between South Asians and Caucasians and other populations has substantial adverse effects on health outcomes among South Asians. The management of ASCVD, CKD, and DM2 in South Asians is currently suboptimal, necessitating greater efforts in the prevention and treatment of these diseases and an increased awareness of this triple threat among patients, providers, and government and professional organizations.

The Task Force on Disease Prevention and Intervention in South Asians was convened by the Cardio Renal Society of America, in partnership with the National Kidney Foundation (NKF) of Arizona and Twinepidemic Inc. (details on participating organizations and members are given on page 1 and in the Appendix) to address the comorbid conditions of ASCVD, CKD, and DM2 and examine the growing body of evidence from diverse sources. The Task Force included endocrinologists, cardiologists, diabetologists, nephrologists, and epidemiologists from the United States, Canada, Australia, the United Kingdom, and India. Several Task Force meetings were held over the past 5 years and consisted of invited lectures by recognized

authorities and concurrent discussion groups related to epidemiology, clinical science, biomarkers, barriers to preventing such epidemics, and strategies to overcoming obstacles.

These meetings yielded consensus statements that focus on certain key questions, which are detailed in this article. The consensus statements are a distillation of the extensive deliberations of the discussion groups, which examined the evidence in their respective areas of expertise and together refined the conclusions. The purpose of these statements is to clarify important differences between South Asians and other populations and to develop consensus-based recommendations for management of ASCVD, CKD, and DM2, which will aid clinical decision-making, health care delivery, and quality of care for the South Asian population. This field of research is increasingly becoming the focus of intense investigation, and additional relevant studies are continually being published. We intend to reconvene a follow-up conference when additional sufficient evidence warrants an update to this group's recommendations. Until then, we propose that this statement be considered to present the current *state of the science* on this topic.

Methods

The Delphi process is used widely in health research, in the areas of medical technology, education, and training, as well as in setting priorities and developing nursing and clinical practices and interventions [7]. This process was developed in the United States in the 1960s and has been applied to problems in social services, education, government, and industry.

The Delphi process enables a large group of experts to respond to a questionnaire and, in some situations, to meet and discuss the process and resolve uncertainties or ambiguities in the wording of the questionnaire. In order to create this consensus document, we used a modified Delphi process which included several rounds of review.

Round 1

Relevant experts provided opinions on specific topics based on their knowledge and experience. These opinions were grouped together under a limited number of headings and statements and were drafted into a questionnaire for all participants. Participants then responded to each statement on a scale of 1 (absolute disagreement) to 10 (strong agreement).

Round 2

The modified Delphi process incorporated the "nominal group" technique, which used a highly structured meeting to gather information. It consisted of at least 2 rounds of review during which panelists rated, discussed, and then rerated a series of statements derived from detailed literature reviews conducted and provided to participants as background material. Participants' agreement with statements was summarized using median ratings, and consensus was assessed using interquartile ranges (IQRs) for continuous numerical scales. These summary statistics were fed back to participants at each round in tabular form of the rankings at each point on the scale histograms or other graphic representations of the range. Feeding back the group responses enabled the individual participants to reconsider their initial rankings relative to their colleagues' assessments. The group facilitator was tasked with ensuring that all participants were allowed to express their views and with preventing any one or few personal or professional views from dominating the discussion. Further, participants in both the nominal and Delphi group panels were selected for diversity of scientific perspective and opinion to help reduce the likelihood that any one particular interest or preconceived opinion would dominate. Finally, ratings were assessed to determine if an acceptable degree of consensus was obtained; a third round of rating after modifications to specific statements may have been needed to gain consensus.

The rating panel scored each statement as follows:

Median score 8–10: appropriate statement.

Median score 4–7: appropriateness of the statement was reasonable but not certain, and/or additional research or study was needed to establish a definitive consensus. The category of "uncertain" was used when

insufficient data were available for a definitive categorization or there was substantial disagreement on the appropriateness of the statement.

Median score 1–3: the statement was completely unsupported by or even went contrary to available data.

Scores were divided into these 3 levels of appropriateness determined by the panel, although the numeric designations should be viewed as a continuum. It is anticipated that consensus will continue to evolve as additional data are generated and information from the implementation of the consensus statement is accumulated. The existence of consensus does not mean that the "correct" answer has been found, but instead might reflect collective ignorance rather than collective wisdom. Further, this nominal group technique is not a replacement for rigorous scientific meta-analyses or reviews of published reports nor for original research, but rather a means of identifying current medical opinion and areas of disagreement.

Class of recommendation (COR) and level of evidence (LOE) ratings were assigned according to the American College of Cardiology/American Heart Association (ACC/AHA) classification system [8]. The COR ratings were based on median scores: 1–3 = Tier III; 4–5 = Tier IIb; 6–7 = Tier IIa; 8–10 = Tier I. Statements were assigned LOE ratings of A, B, or C based on quality of evidence, with level A signifying the highest quality.

Results

Median scores for consensus statements regarding CVD, DM2, renal disease, and miscellaneous related topics and ratings for COR and LOE are shown in Tables 1–4, respectively. The writings and discussions by participants leading to the compiled scores are provided as key summaries and detailed discussions by topic below, and fully referenced evidence summaries are included in the online supplement (for all online suppl. material, see www.karger.com/doi/10.1159/000499341).

Risk Factors for CVD in South Asians

The consensus statements for CVD are presented in Table 1. It was determined that South Asians have excess ASCVD burden, with higher prevalence and mortality than other populations. South Asians are also more likely than many other populations to have high triglycerides, low high-density lipoprotein cholesterol (HDL-C), and high lipoprotein(a) concentrations. Among these, high levels of lipoprotein(a) are especially strongly associated with increased risk of total and premature ASCVD events (both fatal and nonfatal) and elevated total mortality rates. Beyond the increased prevalence of dyslipidemia, South Asians have greater prevalence of inflammation (manifested by high levels of inflammatory biomarkers including high-sensitivity C-reactive protein), increased rates of hypertension and DM2, which occurs earlier in life and at a lower body mass index (BMI) than in Caucasians. Additionally, South Asians are less physically active than other populations [9] and consume very high carbohydrate diets linked to excess mortality in the PURE Study [10].

The increased risk of CVD among South Asians (and the absence of risk calculators validated in South Asians in North America) implies a need for lower thresholds for various risk factors (e.g., BMI, waist circumference, and serum cholesterol) at which to diagnose high-risk status. South Asian men have high coronary artery calcium burden, similar to that of white men, which is higher than that of other racial/ethnic groups.

Unfortunately, awareness of major ASCVD risk factors (e.g., DM2, hypertension, and dyslipidemia) is low among South Asians, even among those who have these risk factors, and few of those who are aware are treated and even fewer achieve control of their elevated risk factors.

Further, due to their particularly poor prognosis in secondary prevention, all South Asians with a prior ASCVD event are in urgent need of aggressive, evidence-based preventive medical therapy to achieve guideline-recommended goals. Aggressive efforts recommended

Table 1. Consensus statements, scores, class of recommendation (COR), and level of evidence (LOE) for cardiovascular disease (CVD)

	Median (IQR Q1–Q3)	COR	LOE
Risk			
South Asians face an earlier onset and worse outcome from ASCVD even after adjustment for traditional risk factors	9 (8–10)	I	A
South Asian men have a higher atherosclerotic burden as detected by coronary artery calcium compared to other ethnic groups	7 (6–8)	IIa	A
In the absence of risk calculators validated in South Asians in North America, traditional 10-year CVD risk calculations should be modified in this group by a factor of 1.5	8 (6.5–8)	I	B
Smaller coronary artery caliber being masqueraded by higher plaque burden in the arterial wall plays an important role in the increased ASCVD risk in South Asians	8 (5.5–8)	I	C
Inflammation plays a greater role in the development and prognosis of ASCVD in South Asians than white Caucasians	7 (5.5–8)	IIa	B
Prevalence of hypertension is increasing in both urban and rural populations in the Indian subcontinent	9 (8–10)	I	A
South Asians face similar complication rates from hypertension as white Caucasian populations	8 (5.5–8.5)	I	A
South Asians have higher risk of stroke than white Caucasians	8 (5.5–8.5)	I	C
Incidence of atrial fibrillation differs between South Asians and white Caucasians	7 (5.5–8)	IIa	C
Heart failure incidence, presentation, treatment, and prognosis differ in South Asians vs. white Caucasian populations	7 (5.5–8)	IIa	B
High levels of lipoprotein(a) are prevalent in one third of South Asians, and are associated with extensive and premature CAD leading to high mortality at a young age	8 (8–8)	I	A
Prevention			
Optimal BMI for South Asians for the prevention of ASCVD and DM should be 23 kg/m^2	8 (6–9.5)	I	A
Optimal waist circumference for South Asians for the prevention of ASCVD and DM should be 90 cm for men and 80 cm for women	8 (7.5–9)	I	A
According to both the International Atherosclerosis Society and National Lipid Association, the optimum non-HDL-C for primary prevention of CVD in South Asians is <130 mg/dL, which corresponds to an LDL-C <100 mg/dL and total cholesterol <170 mg/dL	8 (7.5–9)	I	A
Secondary prevention of CVD in South Asians includes achieving non-HDL-C <100 mg/dL, which corresponds to LDL-C <70 mg/dL and total cholesterol <140 mg/dL	8 (8–9)	I	A
Intervention			
South Asians living in North America and Europe receive cardiovascular care that is less than comparable to white Caucasians	6 (3–7)	IIa	C
South Asians with multivessel CAD should preferentially undergo CABG rather than PCI regardless of diabetes status and LV function	8 (6–8.5)	I	A
South Asians demonstrate similar "resistance" to clopidogrel as whites	6 (4.5–7)	IIa	B
In symptomatic subjects with CHF with optimized medical therapy, CRT and CRT-D implementation is suboptimal in South Asian countries	8 (7–9)	I	C
Cardiac rehabilitation is underused in South Asians	9 (8–9.5)	I	B
Atherogenic lipids such as LDL particle and ApoB should be reserved for high-risk individuals with normal LDL levels when statin use would not be recommended otherwise	8 (6–8.5)	I	A
Statins should be introduced universally for South Asians >40 years of age if LDL-C is >100 mg/dL	7 (6–7)	IIa	B
Quality of Life			
South Asians with ASCVD have a lower quality of life than white Caucasian populations	7 (5–8)	IIa	C
South Asians benefit to the same degree as other populations from evidence-based treatment for ASCVD	9 (7–9.5)	I	A

Median score: 1–3, strong disagreement; 4–7, uncertain statement; 8–10, appropriate statement.

COR: I, strong (median: 8–10); IIa, moderate (median: 6–7); IIb, moderate (median: 4–5), weak; III, no benefit or harm (median: 1–3).

LOE: A, high-quality evidence from ≥1 randomized controlled trial (RCT); meta-analysis of high-quality RCTs; ≥1 RCT with high-quality registry study; B, moderate quality of evidence from ≥1 RCT; ≥1 nonrandomized, observational, or registry study; or meta-analyses of such studies; C, randomized, nonrandomized, observational, or registry studies with limitations; meta-analyses of such studies; physiologic or mechanistic studies in humans; or consensus of expert opinion based on clinical experience.

ApoB, apolipoprotein B; ASCVD, atherosclerotic cardiovascular disease; CABG, coronary artery bypass grafting; CAD, coronary artery disease; CHF, congestive heart failure; CRT, cardiac resynchronization therapy; CRT-D, CRT defibrillator; DM, diabetes mellitus; HDL-C, high-density lipoprotein cholesterol; IQR, interquartile range; LDL-C, low-density lipoprotein cholesterol; PCI, percutaneous coronary intervention.

in South Asians include the assessment of coronary artery atherosclerosis in primary prevention, with a coronary artery calcium score or even computed tomography angiography, and in stable secondary prevention, with coronary angiography. Further, in terms of approaches to coronary revascularization, South Asians with DM2 who have multivessel coronary artery disease (CAD) are best treated by coronary artery bypass grafting instead of percutaneous coronary intervention.

DM2 in South Asians

Consensus statements related to DM2 are presented in Table 2. The statements strongly recommend decreased intake of total calories, saturated fats, carbohydrates (especially sugars, particularly fructose, and *trans*-fatty acids, and advocate the increased intake of monounsaturated and polyunsaturated fatty acids and dietary fiber. Increased physical activity is also strongly recommended. Special consideration should be given to the management of DM2 during prolonged fasting for Ramadan and other religious festivals, especially among South Asians taking insulin or sulfonylureas. Screening for an increased risk for developing new-onset DM2 and for unrecognized DM2 is highly recommended, in which regard the application of the Indian Diabetes Risk Score [11] is a reasonable strategy. Use of evidence-based glucose-lowering regimens to achieve optimal glycemic control is of particular importance among South Asians not only to minimize the risk of microvascular complications of DM2 but also to help reduce incident ASCVD. Key unmet needs in this regard include (1) research into finding optimal regimens for the unique genetic, cultural, and economic situations of South Asians not only in their home countries but also in the United States and worldwide, and (2) cost-effective implementation of existing knowledge.

Due to the high prevalence and increased adverse impact of central obesity among South Asians, dietary and lifestyle (especially physical activity) interventions to lower BMI and waist circumference are especially recommended in this population. Specific goals to reduce dietary intake of sugars and other carbohydrates are recommended in view of their typically high intake and the high susceptibility to obesity and other adverse consequences among South Asians. Other high-priority dietary recommendations among this population include increased intake of dietary ω-3 fatty acids and monounsaturated fatty acids to replace saturated fats and carbohydrates, and physical activity above that typically encouraged for non–South Asian populations.

CKD in South Asians

Consensus statements for CKD are described in Table 3. Increased prevalence of risk factors, such as DM2, hypertension, abdominal obesity, and insulin-resistant states, as well as early CAD, predisposes the South Asian patient to early and aggressive CKD. CKD is also an independent risk factor for CAD. The prevalence of proteinuric diabetic kidney disease is increased among South Asians relative to other racial groups. After the development of CKD, South Asians show faster progression to end-stage renal disease, even when living outside of South Asia [12, 13]. In addition, this population has a higher mortality rate after renal transplantation. Because CKD is asymptomatic long after it begins to develop, screening methods should be used (e.g., looking for DM2, hypertension, abdominal obesity, hypertriglyceridemia, and a positive family history of CKD) to help identify patients at highest risk. All South Asian individuals with DM2, hypertension, CAD, or the metabolic syndrome should be screened for kidney disease, which should include measurement of serum creatinine and calculation of estimated glomerular filtration rate (eGFR), as well as spot urine testing for the ratio of albumin-to-creatinine concentrations. All adults (≥18 years of age) of South Asian origin should be screened for hypertension. The US National Institutes of Health recommends the DASH diet (Dietary Approaches to Stop Hypertension) for all hypertensive

Table 2. Consensus statements, scores, class of recommendation (COR), and level of evidence (LOE) for diabetes mellitus (DM2)

	Median (IQR Q1–Q3)	COR	LOE
Risk			
Insulin resistance and its associated features explain much of the excess ASCVD risk in South Asians	8 (7.5–9)	I	A
The Indian Diabetes Risk Score is a cost-effective screening strategy that can be utilized to screen for DM2, metabolic syndrome, and CVD	8 (7–9.5)	I	A
Prevalence of DM2 is more than 20% among South Asians around the world due to a greater proportion of visceral fat for a given BMI and higher level of insulin resistance	9 (8–9.5)	I	A
Diabetes remains uncontrolled in most South Asians (mean HbA_{1c}: 9.2), with ensuing complications in descending order: neuropathy (30%), CVD (23%), nephropathy (21%), retinopathy (16%), and foot ulcers (5%)	9 (8–9)	I	A
Higher levels of postprandial hyperglycemia should be taken into special consideration when managing diabetes in South Asians	9 (7.5–9)	I	A
Prevention			
We should intervene with lifestyle measures at a lower range of BMI in South Asians	9 (9–10)	I	A
We should intervene with lifestyle measures at a lower range of waist circumference in South Asians	9 (9–10)	I	A
We should set separate dietary goals for dietary carbohydrates in view of high intake in South Asians	9 (8–10)	I	A
We should give special consideration to dietary intake of ω-3 fatty acids in South Asians	8 (6–9)	I	B
We should give special emphasis on dietary intake of monounsaturated fatty acids in South Asians	8 (7–8.5)	I	B
Internationally recommended levels of physical activity should be reset to increase the duration of physical activity in South Asians	9 (8–9.5)	I	A
Intervention			
Higher rates of insulin resistance/cardiometabolic-renal syndrome in South Asians should warrant early intervention to prevent diabetes and CAD	9 (8.5–10)	I	B
There should be separate and specific guidelines for managing diabetes in South Asians due to the increased incidence and prevalence of diabetes	9 (8–9.5)	I	B
Pioglitazone is more effective in South Asians than in other ethnic populations	5 (3–8)	IIb	C
Aspirin should be used more aggressively in managing CAD prevention among patients with diabetes in South Asians	8 (6–9)	I	B
Quality of Life			
Special consideration should be given to prolonged fasting by South Asians during Ramadan and other religious festivals	8 (7–9)	I	B
Cost of treatment should be given special consideration in managing diabetes in South Asians residing in native countries	9 (8–10)	I	A

Median score: 1–3, strong disagreement; 4–7, uncertain statement; 8–10, appropriate statement.

COR: I, strong (median: 8–10); IIa, moderate (median: 6–7); IIb, moderate (median: 4–5): weak; III, no benefit or harm (median: 1–3).

LOE: A, high-quality evidence from ≥1 randomized controlled trial (RCT); meta-analysis of high-quality RCTs; ≥1 RCT with high-quality registry study; B, moderate quality of evidence from ≥1 RCT; ≥1 nonrandomized, observational, or registry study; or meta-analyses of such studies; C, randomized, nonrandomized, observational, or registry studies with limitations; meta-analyses of such studies; physiologic or mechanistic studies in humans; or consensus of expert opinion based on clinical experience.

ASCVD, atherosclerotic cardiovascular disease; CAD, coronary artery disease; CVD, cardiovascular disease; HbA_{1c}, glycated hemoglobin; IQR, interquartile range.

Table 3. Consensus statements, scores, class of recommendation (COR), and level of evidence (LOE) for renal disease

	Median (IQR Q1–Q3)	COR	LOE
Risk			
CKD is an independent risk factor for CVD and mortality among South Asians	10 (9–10)	I	B
CKD prevalence is 15–20% among adults in India	9 (7–10)	I	A
All adults of South Asian origin should be screened for hypertension at age 18 years	10 (8–10)	I	A
Patients with advanced CKD (GFR <30 mL/min) should be screened for CVD	10 (8.5–10)	I	A
Patients with any level of CKD in the presence of diabetes mellitus should be screened for CVD	9 (9–10)	I	A
Bone density is lower in South Asians, and yet fractures are paradoxically lower compared to Caucasians	7 (6.5–8.5)	IIa	B
Prevention and diagnosis			
Among hypertensive patients, DASH diet is recommended	9 (7.5–10)	I	A
Individuals with diabetes, hypertension, CAD, and metabolic syndrome should be screened for kidney disease	10 (10–10)	I	A
Screening for kidney disease should include measuring serum creatinine, calculation of eGFR, as well as spot urine for albumin and creatinine	10 (9–10)	I	A
Accuracy of prevalent eGFR calculators need to be confirmed in the South Asian population Appropriate modifier needs to be added if significant difference is detected	10 (9–10)	I	B
There is a need to develop and utilize novel biomarkers for diagnostic and prognostic purposes to detect and intervene in CHF and CKD among South Asians	9 (8–10)	I	A
Intervention			
RAAS inhibitor use should be the preferred therapy for managing hypertension among individuals with diabetes or those with proteinuria (in the absence of NSAID use)	10 (8–10)	I	A
Occurrence of nephropathy with shorter duration (<10 years) and faster progression of diabetes in South Asians should be taken into consideration in management with early and aggressive ARB/ACE use	9 (8–10)	I	B
Chronic use of NSAIDs should be discouraged Combination NSAIDs should be avoided altogether	9 (8–10)	I	A
The daily vitamin D intake for South Asian population >50 years of age should be at least 1 g of calcium per day and 2,000 IU of vitamin D per day	7 (6.5–8.5)	IIa	B
Utilization of renal replacement therapy in qualified subjects in South Asia is suboptimal	9 (8–10)	I	A

Median score: 1–3, strong disagreement; 4–7, uncertain statement; 8–10, appropriate statement.

COR: I, strong (median: 8–10); IIa, moderate (median: 6–7); IIb, moderate (median: 4–5): weak; III, no benefit or harm (median: 1–3).

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ACE, angiotensin-converting enzyme; ARB, angiotensin II receptor blocker; CAD, coronary artery disease; CHF, congestive heart failure; CKD, chronic kidney disease; CVD, cardiovascular disease; DASH, Dietary Approaches to Stop Hypertension; eGFR, estimated glomerular filtration rate; IQR, interquartile range; NSAID, nonsteroidal anti-inflammatory drug.

Table 4. Consensus statements, scores, class of recommendation (COR), and level of evidence (LOE) for miscellaneous topics

	Median (IQR Q1–Q3)	COR	LOE
Prevention			
Medical education is suboptimal in India, with 70% of providers in rural areas having had no formal training and many unqualified health care providers	9 (8–10)	I	B
Intervention			
Nontraditional methods incorporating behavioral, social, spiritual, and environmental strategies should be implemented to complement traditional treatments to enhance CVD prevention	8 (7–10)	I	B
Intrinsic (personal) factors and entrenched beliefs are predominant within South Asian ethnic groups that may lead to reluctance in seeking health care	9 (8–10)	I	A
There is a paucity of outcome studies and an urgent need to enhance research education in South Asia	10 (9.5–10)	I	A
Quality metrics with oversight among providers is strongly needed to improve CVD and CKD outcomes in South Asians	10 (9–10)	I	B
There is an urgent need to create atrial fibrillation, congestive heart failure, and CKD registries in South Asia in order to learn the challenges in improving outcomes	10 (9–10)	I	A

Median score: 1–3, strong disagreement; 4–7, uncertain statement; 8–10, appropriate statement.

COR: I, strong (median: 8–10); IIa, moderate (median: 6–7); IIb, moderate (median: 4–5): weak; III, no benefit or harm (median: 1–3).

LOE: A, high-quality evidence from ≥1 randomized controlled trial (RCT); meta-analysis of high-quality RCTs; ≥1 RCT with high-quality registry study; B, moderate quality of evidence from ≥1 RCT; ≥1 nonrandomized, observational, or registry study; or meta-analyses of such studies; C, randomized, nonrandomized, observational, or registry studies with limitations; meta-analyses of such studies; physiologic or mechanistic studies in humans; or consensus of expert opinion based on clinical experience.

CKD, chronic kidney disease; CVD, cardiovascular disease; IQR, interquartile range.

patients, which is especially important in South Asians. Also, patients with severe CKD (eGFR <30 mL/min) and any level of CKD in the presence of DM2 should be screened for subclinical ASCVD [13, 14].

The accuracy of prevalent eGFR calculators needs to be confirmed in the South Asian population, and appropriate modifiers will need to be added if significant differences are detected. Because the metabolic syndrome is strongly associated with CKD among South Asians and tends to be more responsive to diet and lifestyle changes than other risk factors, prevention programs aimed at the metabolic syndrome could help stem the tide of CKD among South Asians. In addition, if tolerated, agents to block the renin-angiotensin-aldosterone system (RAAS) are reasonable first-line antihypertensive therapy for delaying progression of proteinuric CKD. The incidence of nephropathy with a shorter duration of DM2 (<10 years) and its faster progression in South Asians should be considered in the early and aggressive use of RAAS inhibitor regimens. Chronic use of nonsteroidal anti-inflammatory drugs (NSAIDs) should be discouraged, and combination NSAIDs should be avoided altogether. Early institution of intensive dietary and lifestyle measures, beginning in childhood and maintained throughout life, along with the use of lower thresholds for preventive interventions is likely to have a profound beneficial impact on the prevention and control of ASCVD and CKD in South Asians.

Future Directions

The consensus statements presented here represent an initial step toward incorporating standards of care into the treatment of South Asians although many of these statements apply to all populations and only a few present unique recommendations relative to pathophysiologic and epidemiologic population differences. These statements represent an urgent appeal for early intervention through education both for risk factor screening and for diet and lifestyle intervention among South Asians, as well as other populations. These increased efforts are warranted now, to prevent the significant morbidity and mortality impacting the economies of all countries, even while we continue to conduct additional research by new and ongoing randomized controlled trials and other studies. The Lipid Association of India provides ongoing consensus recommendations for the management of dyslipidemia in Indians, which continue to contribute to a better understanding of best practices for treating cardiometabolic diseases in South Asians [15, 16]. Cardiometabolic-renal disease is increasingly prevalent among South Asians because risk factors, including microalbuminuria, are developing at earlier ages. As a result, early screening strategies for cardiometabolic-renal disease should be implemented. The paucity of randomized controlled trials in or relevant to South Asians results in an urgent need to enhance research among the South Asian diaspora and in South Asia. The current consensus panel calls for increased research in the underserved South Asian population and funding to create registries that would increase understanding and improve management of this large and unique patient population.

A recent statement developed by the American Heart Association about ASCVD risk among South Asians in the United States identified a number of areas for future research, and these are included in the consensus statements presented here. For example, we need to determine appropriate goals for waist circumference, BMI, and blood glucose levels to help reduce the burden of cardiometabolic diseases in this population [17; see also online suppl. material for additional references]. Future research should seek to develop an algorithm that can be used to guide clinical decision-making when treating South Asian populations to prevent these diseases.

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Disclosure Statement

Krishnaswami Vijayaraghavan: AstraZeneca, Boehringer Ingelheim, Novo Nordisk, Amgen, Novartis (speaker's bureau); Amarin, Boehringer Ingelheim, Legacy Heart, Aventyn, Novartis, Baylor Research Institute (consultant); National Lipid Association, Life365, Sanofi, Cardiorenal Society of America (formal advisor activities).

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Peter McCullough, Milan Gupta, Enas Enas, Viswanathan Mohan, and Prakash Deedwania have no conflicts of interest to declare.

Appendix

Consensus Meeting Panel

Co-Chairs: Krishnaswami Vijayaraghavan, Abrazo Arizona Heart Hospital, Phoenix, and University of Arizona, Scottsdale, AZ, USA; Peter McCullough, Baylor University Medical Center, Dallas, TX, USA; and Bhupinder Singh, ZS Pharma, Inc.

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