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Review

Cardiovascular Disease in South Asian Migrants

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ABSTRACT

Cardiovascular disease (CVD) represents a significant cause of global mortality and morbidity. South Asians (SAs) have a particularly high burden of coronary artery disease (CAD). This review describes current literature regarding the prevalence, incidence, etiology, and prognosis of CVD in SA migrants to high-income nations. We conducted a narrative review of CVD in the SA diaspora through a search of MEDLINE and PubMed. We included observational studies, randomized clinical trials, nonsystematic reviews, systematic reviews, and meta-analyses written in English. Of 15,231 articles identified, 827 articles were screened and 124 formed the basis for review. SA migrants have a 1.5-2 times greater prevalence of CAD than age- and sex-adjusted Europids. Increased abdominal obesity and body fat and increased burden of type 2 diabetes mellitus and dyslipidemia appear to be primary drivers of the excess CAD burden in SAs. Sedentary

RÉSUMÉ

Les maladies cardiovasculaires (MCV) représentent une cause importante de mortalité et de morbidité mondiales. Les Sud-Asiatiques (SA) ont un niveau particulièrement élevé de maladie coronarienne. Cette revue compile la littérature actuelle concernant la prévalence, l'incidence, l'étiologie et le pronostic des MCV chez les migrants SA vers les pays à revenu élevé. Nous avons effectué un examen narratif des MCV dans la diaspora SA via une recherche dans MEDLINE et PubMed. Nous avons inclus des études d'observation, des essais cliniques randomisés, des revues non systématiques, des revues systématiques et des méta-analyses écrites en anglais. À partir de 15 231 articles identifiés, 827 articles ont été examinés et 124 ont formé la base pour la revue. Les migrants SA ont une prévalence de maladie coronarienne 1,5 à 2 fois plus grande que les europoïdes, ajusté pour l'âge et le sexe. L'augmentation de l'obésité abdominale et

Globally, cardiovascular disease (CVD) is the leading cause of mortality, morbidity, and health care costs.[1,2] The incidence and outcomes from CVD vary between nations and country of origin.[3,4] South Asians (SAs) (individuals who originate from the Indian subcontinent) have a particularly high prevalence of coronary artery disease (CAD), including SA migrants who live outside the Asian subcontinent, also known as the SA diaspora.[3,5-12] Globally, there are an estimated 1.8 billion SAs,[13] and the SA diaspora is estimated to number more than 24 million.[14,15]

The purpose of this article is to review the existing literature regarding CVD in the SA diaspora. First we describe current information on the etiology, prevalence, and prognosis of CVD in SAs. Specifically, we examine disease burden with respect to CAD, stroke, and heart failure (HF) in SA migrants, with a particular focus on CAD. For the purposes of this review, we do not discuss peripheral vascular disease, cardiac arrhythmias, congenital heart disease, and valvular heart disease, because there is a general paucity of data available in SA migrants. Finally, we describe risk factors that contribute to the burden of CVD in SA.

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lifestyle and changes in diet after immigration are important contributors to weight gain and adiposity. Early life factors, physical activity patterns and, in some cases, reduced adherence to medical therapy may contribute to increased CVD risks in SAs. Novel biomarkers like leptin and adipokines may show distinct patterns in SAs and provide insights into cardiometabolic risk determinants. In conclusion, SAs have distinct CVD risk predispositions, with a complex relationship to cultural, innate, and acquired factors. Although CVD risk factor management and treatment among SAs is improving, opportunities exist for further advances.

du gras corporel, et l'augmentation de la charge du diabète de type 2 et la dyslipidémie semblent être le principal moteur de la charge excessive de la maladie coronarienne chez les SA. Un mode de vie sédentaire et des changements de régime alimentaire après l'immigration sont d'importants contributeurs à la prise de poids et l'adiposité. Des facteurs des stades précoces de l'existence, la façon de pratiquer une activité physique et, dans certains cas, une observance réduite du traitement médical peuvent contribuer à l'augmentation des risques de MCV chez les SA. De nouveaux biomarqueurs telles la leptine et les adipokines peuvent montrer des modèles distincts chez les SA et fournir des indications sur les déterminants du risque cardiométabolique. En conclusion, les SA ont des prédispositions distinctes de risque de MCV, avec une intrication complexe de facteurs culturels, innés et acquis. Bien que la gestion des facteurs de risque des MCV et leur traitement chez les SA s'améliore, des possibilités demeurent pour des avancées ultérieures.

Search Strategy

SA ethnicity was defined as individuals from the Indian subcontinent (India, Pakistan, Bangladesh, Sri-Lanka, and Nepal).[15] This review focuses on SAs who have emigrated to high-income countries,[16] and the primary comparison group was Europids, defined as whites of European ancestry.[17] We conducted a literature review of CVD in the SA diaspora through a search of MEDLINE and PubMed databases from inception to December 2014 using the following search terms and related terms: South Asian migrants, South Asian diaspora, coronary artery disease, stroke, heart failure, and cerebrovascular disease risk factors (full search details in Supplemental Appendix S1). We included observational studies, randomized clinical trials, nonsystematic reviews, systematic reviews, and meta-analyses written in English. In total, 15,231 articles were identified, from which 827 articles were screened. One hundred twenty-four articles formed the basis for this review, with the majority being observational cohort or cross-sectional studies (89.9%). Literature regarding CVD in SAs is mainly based in Canada, the United Kingdom, the United States, Australia, and the Netherlands. We adopted a narrative review structure given the varied countries of residence, sampling strategies, the different time frames for migration, and the wide variety in analytical methods and reporting formats used in these studies. We provided an assessment of quality of evidence (weak, moderate, strong) supporting various findings but did not use a quality rating scale for each article included given that this was a narrative review.

Coronary Artery Disease

Prevalence and incidence

SA migrants have 1.5-2 times the prevalence of CAD compared with age- and sex-adjusted Europids.[5,11,18] For example, in a meta-analysis of Canadian studies by Rana et al.,[19] SA men had 4.97 acute myocardial infarction (MI) events per 1000 population per year compared with 3.29 events among Europid men ($P < 0.001$). Likewise, SA women had 2.35 events per 1000 population per year vs 1.53 events among Europid women ($P < 0.01$). This is consistent with a meta-analysis of SA migrants living in the United Kingdom, which reported a higher incidence of CAD among SAs than among Europids (hazard ratio [HR], 1.35; 95% confidence interval [CI], 1.30-1.40).[20] Furthermore, in a large international case-control study of first acute MIs, SAs presented at an age 6-10 years younger than did Europids.[21] Similarly, data from the Multiple Cause of Mortality database from the National Center for Health Statistics in the United States demonstrated that SAs had high proportional mortality ratio (PMR) from CAD as compared to other ethnicities (SA men 1.43; SA women 1.12).[22]

Etiology

Conventional and novel risk factors contribute to the increased burden of CAD in SAs. With respect to traditional risk factors, a recent systematic review of SAs in Canada showed that compared with other ethnic groups, SAs had a greater prevalence of type 2 diabetes mellitus (DM), insulin resistance (IR), increased visceral adiposity, body fat, lower high-density lipoprotein (HDL) levels, increased carbohydrate intake, and decreased physical activity.[19] DM was the most consistently elevated risk factor, with a 1.4-2.5−fold increase in DM among SAs compared with Europids. This may reflect the increased rates of abdominal obesity in SAs compared with Europids.[23-25] Furthermore, at any given body mass index (BMI), SA migrants were found to have 3.9% ($P < 0.001$) greater body fat than Europids.[26] The largest case-control study to examine the earlier age of MI in SAs found that the age gap in first presentation of MI vs other groups was largely explained by higher rates of conventional risk factors.[11] However, the increased burden of CAD in SAs may not be fully accounted for by traditional risk factors alone, and novel risk factors such as unique genetic polymorphisms or elevated lipoprotein(a) may also contribute to the elevated CAD in SAs.[19,27,28]

Prognosis

There is mixed evidence supporting a differential prognosis of SAs with CAD compared with other ethnicities. Several studies demonstrated an increased mortality rate in SA immigrants following acute coronary syndromes, ranging from a 33%-300% increased risk compared with Europids.[10,22,27,29]