Current Emergency and Hospital Medicine Reports (2018) 6:45–48
https://doi.org/10.1007/s40138-018-0154-9

CARDIOVASCULAR CARE (L ROEVER, SECTION EDITOR)

Cardiovascular Risk in South America Compared to Other Countries

Leonardo Roever[1] · Elmiro Santos Resende[1] · Anaisa Silva Roerver-Borges[2]

Published online: 14 April 2018
© Springer Science+Business Media, LLC, part of Springer Nature 2018

Abstract

Purpose of Review The goal is to discuss the prevalence of cardiovascular risk in South America compared to other countries.
Recent Findings The results highlight the importance of evidence-based approaches to promote the reduction of the prevalence of cardiovascular risk factors in a global context. Indicating the need for policies that promote cardiac health in the global sphere.
Summary Future efforts to generate global of risk factors for cardiovascular disease should be implemented. As well as prevention and treatment measures aimed at decreasing cardiovascular outcomes.

Keywords Hypertension · Cardiovascular risk factors · Lipids · Metabolic syndrome · Cardiovascular disease

Abbreviations

WC	Waist circumference
MetS	Metabolic syndrome
CVD	Cardiovascular disease
W	Women
M	Man
AMI	Acute myocardial infarction
WHR	Waist/hip ratio
CAD	Coronary artery disease

Introduction

The mortality attributed to cardiovascular diseases (CVD) has fallen considerably in the last decades and it remains the major cause of premature death worldwide [1]. Ectopic fat is a risk marker for cardiovascular disease, in that it is associated with a much higher prevalence of comorbidities such as diabetes, hypertension, high cholesterol, stroke, acute coronary syndromes, metabolic syndrome, heart failure, and atrial fibrillation, which then increases the risk for cardiovascular disease 1–3. In this review, we will address the risk factors for CVD in South America compared to other continents.

In a cross-sectional study with 101 volunteers (48 women (W) and 52 men (M), mean age 56.5 ± 18, range 19–74 years) drawn from the Uberlândia Heart Study, we observed the prevalence of 48.5% were W, 40.2% M was elevated blood pressure [BP (systolic BP ≥ 130 mmHg or diastolic BP ≥ 85 mmHg)], 39.3% of patients were obese, 61.8% had abdominal obesity, 32% of hypertriglyceridemia, 33.2% of low HDL-C and LDL-C, 40.2% of high total cholesterol, 33.2% high non-HDL-C, 22.7% had mixed dyslipidemia, 20.2% had impaired fasting glucose, and 41.1% had metabolic syndrome [2•, 3•, 4••].

In 1659 Chinese patients, the prevalence of hypertension, diabetes, overweight or obesity, dyslipidemia, and current smoking was 62.4, 6.4, 34.3, 42.7, and 6.1%, respectively, and these risk factors were associated with age, gender, education level, yearly family income, altitude, and occupation. The prevalence of clustering of ≥ 1, ≥ 2, and ≥ 3 cardiovascular disease risk factors were 79.4, 47.1, and 20.9%, respectively. A greater grouping of ≥ 2 and ≥ 3 cardiovascular disease risk factors were found in patients with higher education and annual family income, and those living at an altitude < 3500 m and in one municipality [5].

In a study in Pakistan with 582 individuals, 61.16% were positive for cardiovascular disease, and 38.83% were negative. The authors found a significant association of education, household population, marital status, blood pressure, blood sugar, age, family history, stress, and sleep with cardiovascular diseases. Stress and contextual risk factors will contribute to cardiovascular diseases in this population [6].

This article is part of the Topical Collection on *Cardiovascular Care*

✉ Leonardo Roever
leonardoroever@hotmail.com

[1] Department of Clinical Research, Federal University of Uberlândia, Av. Pará, 1720 - Bairro Umuarama, Uberlândia, MG 38400-902, Brazil

[2] Master Institute of Education President Antonio Carlos, IMEPAC, Araguari, Brazil

In "INTERHEART (A Study of Risk Factors for First Myocardial Infarction in 52 Countries and Over 27,000 Subjects)," with 15,152 cases of first acute myocardial infarction (AMI) patients and 14,820 control subjects from 52 countries, of which 1237 cases and 1888 control subjects were from 6 Latin American countries (Argentina, Brazil, Colombia, Chile, Guatemala, and Mexico). The major worldwide factors associated with AMI were dyslipidemia, smoking, psychosocial factors (such as depression and stress), hypertension, diabetes, abdominal obesity, and protective factors such as physical activity, diet rich in fruits and vegetables, and moderate consumption of alcohol [7••, 8••].

In a study conducted in Argentina, Cuba, Mexico, and Venezuela, the authors reported an independent association between AMI and the following risk factors: total cholesterol, hypertension, smoking, and diabetes [9].

In the AFIRMAR study, which was carried out in Brazil, reported associations of AMI and the following risk factors: smoking, high blood sugar levels, history of diabetes, waist/hip ratio (WHR), family history of heart disease, low-density lipoprotein cholesterol, and hypertension. Alcohol consumption had a significant protective effect [10].

In the CARMELA (Cardiovascular Risk Factor Multiple Evaluation in Latin America) study, the authors included 11,550 people ages 25 to 64 years, who lived in seven Latin American cities (Barquisimeto, Venezuela; Bogota, Colombia; Buenos Aires, Argentina; Lima, Peru; Mexico City, Mexico; Quito, Ecuador; and Santiago, Chile). The diagnosis of hypertension and diabetes were high (64 and 78% of affected individuals, respectively) but relatively low for hypercholesterolemia (41%) [11].

In the CARDIA study, the authors found that the abdominal obesity measured by waist girth or WHR is associated with early atherosclerosis as measured by the presence of CAC in African American and white young adults [12].

Kaees and colleagues explored the associations between coronary artery disease (CAD) and four different obesity measures [body mass index (BMI)], waist circumference, waist/height and waist/height2 in a cohort of 16,657 subjects (40.4% men; 20.8% CAD patients). In this study, 42.8% of subjects were classified as overweight, 31.7% as obese, and 39.8% had abdominal obesity. BMI was the strongest discriminator between CAD patients and controls. Obesity correlates of CAD, being the only independent associate of CAD in men, and waist, waist/height and waist/height2 increased the odds of CAD [13].

In the Latin American and Caribbean (LAC) region, the authors estimated from individual-level patient data pooled from population-based surveys ($n = 31,009$) from eight LAC countries and from a national survey of the United States (US) population [13].

Prevalence of diabetes mellitus, hypertension, and low high-density lipoprotein (HDL) cholesterol in LAC were 5, 20.2, and 53.3%, respectively. LAC women had higher prevalence of obesity and low HDL cholesterol than men. Obesity, hypercholesterolemia, and hypertriglyceridemia were more prevalent in the US population than in LAC population (31 vs 16.1%, 16.8 vs 8.9%, and 36.2 vs 26.5%, respectively). The low HDL cholesterol was higher in LAC than in the US (53.3 vs 33.7%) [14].

In a multicenter, prospective, population-based Hispanic Community Health Study/Study of Latinos including individuals of Cuban ($n = 2201$), Dominican ($n = 1400$), Mexican ($n = 6232$), Puerto Rican ($n = 2590$), Central American ($n = 1634$), and South American backgrounds ($n = 1022$) aged 18 to 74 years, analyses involved 15,079 participants; the authors reported the prevalence of obesity and current smoking rates were highest among Puerto Rican participants (for men, 40.9 and 34.7%; for women, 51.4 and 31.7%, respectively); hypercholesterolemia was highest among Central American men (54.9%) and Puerto Rican women (41.0%). Large proportions of participants (80% of men, 71% of women) had at least 1 risk factor. The prevalence of 3 or more risk factors was highest in Puerto Rican participants (25.0%) and significantly higher among participants with less education (16.1%). CAD and stroke prevalence were low (4.2 and 2.0% in men; 2.4 and 1.2% in women, respectively). Hypertension and smoking were directly associated with CAD in both sexes as were hypercholesterolemia and obesity in women and diabetes in men. In stroke patients, the associations were positive with hypertension in both sexes, diabetes in men, and smoking in women [15].

In native South Asians, especially at younger ages, compared with individuals from other countries, the first AMI was lower in South Asian countries than in other countries. Protective factors were lower in South Asian controls than in controls from other countries (moderate- or high-intensity exercise, 6.1 vs 21.6%; daily intake of fruits and vegetables, 26.5 vs 45.2%; alcohol consumption ≥once/weak, 10.7 vs 26.9%). Some risk factors were more common in native South Asians (elevated apolipoprotein B100 /apolipoprotein A-I ratio, 43.8 vs 31.8%; history of diabetes, 9.5 vs 7.2%), and the relative associations were found in South Asians compared with individuals from other countries for former smoking, apolipoprotein B100 /apolipoprotein A-I ratio for the top vs lowest tertile, waist-to-hip ratio for the top vs lowest tertile, history of hypertension, history of diabetes, psychosocial factors such as depression and stress at work or home, regular moderate- or high-intensity exercise, and daily intake of fruits and vegetables [16].

In the African population and in three ethnic subgroups (black, colored, and European/other Africans) and compared with those found in the overall INTERHEART study, the relationships between common CVD risk factors and AMI were found to be similar to those in the overall INTERHEART study. The risk factors (smoking history, diabetes history,

hypertension history, abdominal obesity, and ratio of apolipoprotein B to apolipoprotein A-1) provided a population attributable risk of 89.2% for AMI. The risk for AMI increased with higher income and education in the black African group in contrast to findings in the other African groups. The prevalence of history of hypertension revealed higher AMI risk in the black African group than in the overall INTERHEART group [17•].

In a Japanese study, they used 384 sets of 384 cases and 656 controls. Smoking, hypertension, and angina pectoris were associated with an increased risk of AMI, and alcohol use and leisure-time exercise were related to a decreased risk of AMI in the elderly as well as in middle-aged persons. Diabetes mellitus was significantly associated with an increased risk of AMI in older persons, and hypercholesterolemia was related to an increased risk of AMI in middle-aged individual's [18].

In the INTERHEART China study, the authors reported in Northern higher rates of smoking and hypertension, whereas southern Chinese reported lower fruit and vegetable intake and higher rates of depression. In China, the participants were older, with lower body mass index and waist-to-hip ratios, lower total and low-density lipoprotein cholesterol levels, ApoB lipoprotein and ApoB to ApoA-1 ratios, but higher high-density lipoprotein cholesterol and ApoA-1. All nine INTERHEART CVRFs, education, and income were significantly associated with MI in the Chinese cohort. The authors reported an association between certain CVRFs and AMI for China vs other regions, with stronger associations for the Chinese for diabetes, depression, and permanent stress and lower for the Chinese for abdominal obesity. Diabetes and psychosocial factors have strong associations with risk of AMI in China [19].

In the European Study on Cardiovascular Risk Prevention and Management, the authors reported 72.8 and 64.8% of patients had hypertension and dyslipidemia, respectively; 47.0% had both conditions. Small but statistically significant associations between lipid levels and blood pressure were observed in a large, multinational European population [20].

Among the US adolescents, the prevalence was 14% for prehypertension/hypertension, 22% for borderline-high/high low-density lipoprotein cholesterol, 6% for low high-density lipoprotein cholesterol (< 35 mg/dL), and 15% for prediabetes/diabetes [21•].

In a study with 3495 US adolescents between the ages of 12 and 19 years, approximately 73.2% of the participants had at least one criterion, with the estimated metabolic syndrome (MetS) prevalence being 10.1%. Prevalence was higher in males than females. Both Hispanic males and females had significantly greater odds of metabolic syndrome. Abnormal waist circumference and abnormal triglycerides levels were the most common individual criteria [22].

In 1038 Asian Indian immigrants, aged 18 years and older at seven US sites, the prevalence of diabetes was 17.4%, and 33% had prediabetes. Cardiovascular risk factors, especially high levels of triglycerides, total cholesterol, LDL cholesterol, homocysteine, and C-reactive protein, and low levels of HDL cholesterol, were also prevalent and MetS was 26.9% by the original NCEP/ATP III criteria, 32.7% by the modified NCEP/ATP III criteria, and 38.2% by the IDF criteria. The MetS rates for women, but not for men, increased with age using all three criteria [23].

Recent studies have shown the association of rheumatic diseases with cardiovascular risk factors [24–26].

Finally, we are favoring the screening of cardiovascular risk factors in the vulnerable population, as well as evidence-based prevention and treatment measures aimed at reducing the burden of global cardiovascular disease.

Conclusion

CVD risk factors are prevalent worldwide. Multicentric efforts should be implemented in order to verify individuals affected by cardiovascular risk factors as well as implementing treatment and prevention measures in this population aiming at the decrease of cardiovascular events.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

References

Papers of particular interest, published recently, have been highlighted as:
- • Of importance
- •• Of major importance

1. Oliveira GB, Avezum A, Roever L. Cardiovascular disease burden: evolving knowledge of risk factors in myocardial infarction and stroke through population-based research and perspectives in global prevention. Front Cardiovasc Med. 2015;2:32.
2.• Roever L, Resende ES, Diniz AL, Penha-Silva N, Veloso FC, Casella-Filho A, et al. Abdominal obesity and association with atherosclerosis risk factors. Medicine (Baltimore, Md.). 2016;95:e1357. **Association of visceral fat with cardiovascular risk factors.**
3.• Roever L, Resende ES, Diniz AL, et al. Ectopic adiposopathy and association with cardiovascular disease risk factors: the Uberlândia Heart Study. Int J Cardiol. 2015;190:140–2. **Association of visceral fat with cardiovascular risk factors.**
4.•• Roever LS, Resende ES, Diniz AL, et al. Perirenal fat and association with metabolic risk factors. Medicine (Baltimore). 2015;94:e1105. **Association of peri-renal fat with cardiovascular risk factors.**
5. Xu S, Jiayong Z, Li B, et al. Prevalence and clustering of cardiovascular disease risk factors among Tibetan adults in China: a population-based study. PLoS One. 2015;10(6):e0129966.

6. Akhtar S, Asghar N. Risk factors of cardiovascular disease in district Swat. J Pak Med Assoc. 2015;65(9):1001–4.
7.•• Yusuf S, Hawken S, Ounpuu S, INTERHEART Study Investigators, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004;364:937–52. **Association of cardiovascular risk factors with acute myocardial infarction.**
8.•• Lanas F, Avezum A, Bautista LE, INTERHEART Investigators in Latin America, et al. Risk factors for acute myocardial infarction in Latin America: the INTERHEART Latin American study. Circulation. 2007;115:1067–74. **Association of cardiovascular risk factors with acute myocardial infarction.**
9. Ciruzzi M, Schargrodsky H, Pramparo P, Rivas Estany E, Rodriguez Naude L, de la Noval Garcia R, et al. Attributable risks for acute myocardial infarction in four countries of Latin America. Medicina (B Aires). 2003;63:697–703.
10. Piegas LS, Avezum A, Pereira JC, AFIRMAR Study Investigators, et al. Risk factors for myocardial infarction in Brazil. Am Heart J. 2003;146:331–8.
11. Silva H, Hernandez-Hernandez, Vinueza R, CARMELA Study Investigators, et al. Cardiovascular risk awareness, treatment, and control in urban Latin America. Am J Ther. 2010;17:159–66.
12. Lee CD, Jacobs DR Jr, Schreiner PJ, Iribarren C, Hankinson A. Abdominal obesity and coronary artery calcification in young adults: the Coronary Artery Risk Development in Young Adults (CARDIA) study. Am J Clin Nutr. 2007;86:48–54.
13. Kaess BM, Jozwiak J, Mastej M, Lukas W, Grzeszczak W, Windak A, et al. Association between anthropometric obesity measures and coronary artery disease: a cross-sectional survey of 16,657 subjects from 444 Polish cities. Heart. 2010;96:131–5.
14. Miranda JJ, Herrera VM, Chirinos JA, Latin American Consortium of Studies in Obesity, et al. Major cardiovascular risk factors in Latin America: a comparison with the United States. PLoS One. 2013;8:e54056.
15. Daviglus ML, Talavera GA, Avilés-Santa ML, Allison M, Cai J, Criqui MH, et al. Prevalence of major cardiovascular risk factors and cardiovascular diseases among Hispanic/Latino individuals of diverse backgrounds in the United States. JAMA. 2012;308:1775–84.
16. Joshi P, Islam S, Prem Pais P, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. JAMA. 2007;297(3):286–94.
17.• Steyn K, Sliwa K, Hawken S, Commerford P, Onen C, Damasceno A, et al. Risk factors associated with myocardial infarction in Africa. Circulation. 2005;112(23):3554–61. **Association of cardiovascular risk factors with acute myocardial infarction.**
18. Miyake Y. Risk factors for non-fatal acute myocardial infarction in middle-aged and older Japanese. Fukuoka Heart Study Group. Jpn Circ J. 2000;64(2):103–9.
19. Teo KK, Liu L, Chow CK, Wang X, Islam S, Jiang L, et al. Potentially modifiable risk factors associated with myocardial infarction in China: the INTERHEART China study. Heart. 2009;95(22):1857–64.
20. Borghi C, Rodriguez-Artalejo F, De Backer G, Dallongeville J, Medina J, Guallar E, et al. The association between blood pressure and lipid levels in Europe: European Study on Cardiovascular Risk Prevention and Management in Usual Daily Practice. J Hypertens. 2016;34(11):2155–63.
21.• May AL, Kuklina EV, Yoon PW. Prevalence of cardiovascular disease risk factors among US adolescents, 1999-2008. Pediatrics. 2012;129(6):1035–41. **Prevalence of cardiovascular risk factors in adolescents.**
22. Miller JM, Kaylor MB, Johannsson M, et al. Prevalence of metabolic syndrome and individual criterion in US adolescents: 2001-2010 National Health and Nutrition Examination Survey. Metab Syndr Relat Disord. 2014;12(10):527–32.
23. Misra R, Patel T, Kotha P, et al. Prevalence of diabetes, metabolic syndrome, and cardiovascular risk factors in US Asian Indians: results from a national study. J Diabetes Complicat. 2010;24(3):145–53.
24. Cipriani P, Ciccia F, Guggino G, et al. Cardiovascular disease in primary Sjögren's syndrome. Rev Recent Clin Trials. 201:15. https://doi.org/10.2174/1574887113666180315130336.
25. Caso F, Tasso M, Ambrosino P, et al. Cardiovascular risk markers and major adverse cardiovascular events in psoriatic arthritis patients. Rev Recent Clin Trials. 2018;13 https://doi.org/10.2174/1574887113666180314105511.
26. Kolliker Frers RA, Cosentino V, et al. Immune-mediated inflammation promotes subclinical atherosclerosis in recent-onset psoriatic arthritis patients without conventional cardiovascular risk factors. Front Immunol. 2018;9:139. https://doi.org/10.3389/fimmu.2018.00139.