

JACC FOCUS SEMINAR: TROPICAL MEDICINE

INTRODUCTION

Tropical Cardiovascular Diseases

The Forgotten Orphans



Raman Krishna Kumar, MD DM FAHA,^{a,b,c} Valentin Fuster, MD, PhD,^{d,e}
Dorairaj Prabhakaran, MD, DM, FNA, DSc (HONORIS CAUSA)^{b,c,f}

Although the importance of tropical diseases was recognized almost 125 years ago, they have often been neglected or studied as esoteric disorders. In 1902, the Parsi benefactor of the famous London School of Hygiene and Tropical Medicine, Bomanjee Dinshaw Petit, wrote a letter to Sir Francis Lovell, the Dean of the school, that “this institution, whilst according ample scope to students of diseases that well-nigh devastate the East, will be the means of bringing the Western and Eastern minds together to afford help to the suffering East, and thus cementing that union of hearts.”¹

Despite the push toward global health with global solutions for the problems faced by people living in both the tropics and nontropics, several tropical cardiovascular diseases continue to be neglected. This is despite the fact that approximately 40% of the world’s population live in the tropics. If the current rates of population growth continue, by 2050, the majority of the world’s population will live in the region. A number of specific cardiovascular diseases that result in considerable loss of lives and livelihood are largely confined to the tropics. Although there is a relative paucity of research on these conditions, in the past 3 to 4 decades, there has been a significant improvement in our understanding on the disease biology as well as important changes in management.

This series has 4 in-depth reviews on cardiovascular conditions largely found in the tropical world.

They include infections and cardiovascular disease, rheumatic heart disease, Takayasu arteritis, and cardiomyopathies and nutritional heart disease. These 4 categories together account for a substantial burden of cardiovascular disease in low-income as well as low- and middle-income regions in the tropics. With widespread human migration, many of these diseases do not respect geographic boundaries anymore and may need to be dealt with in high-income regions. There is therefore a need for most practicing cardiologists across the globe to become familiar with these conditions. The disease biology, clinical features, natural history, and management are unique for each of these conditions. Additionally, there are important research and public health priorities that need to be addressed. There is a need for global awareness and concerted global efforts to address the burden of the otherwise neglected diseases. This series has been authored by vastly experienced experts from across the globe. The reviews are accessible, concise, and contemporary.

The first paper relates to tropical infections and cardiovascular disease.² This review is specially included because, despite the high disease burden particularly in low- and middle-income countries and considerable curiosity, the cardiovascular manifestations of common acute tropical infections are grossly understudied and under-reported. The true impact of tropical infections on the cardiovascular system may be underestimated. The present review aims to summarize tropical infections affecting the cardiovascular system. Included diseases were chosen based on expert consensus, disease burden, public health implications, and specific cardiovascular implications. Included in this chapter are tropical viral infections (dengue, zika, chikungunya), protozoal infections (malaria, leishmaniasis, Human African trypanosomiasis), helminth infections (echinococcus,

From the ^aAmrita Institute of Medical Sciences and Research Centre, Amrita Viswa Vidyapeetham, Cochin, Kerala, India; ^bPublic Health Foundation of India (PHFI), Gurugram, India; ^cCentre for Chronic Disease Control, New Delhi, India; ^dThe Zena and Michael A. Wiener Cardiovascular Institute, Icahn School of Medicine at Mount Sinai (ISMMS), New York, New York, USA; ^eCentro Nacional de Investigaciones Cardiovasculares (CNIC), Madrid, Spain; and the ^fNCD epidemiology, London School of Hygiene and Tropical Medicine, London, United Kingdom.

cysticercosis, schistosomiasis), and bacterial infections (tuberculosis). Acute rheumatic fever is addressed in a separate chapter on rheumatic heart disease, and Chagas disease is addressed in the section on “Cardiomyopathies and Nutritional Heart Disease.” We expect this review to demystify and improve our understanding of the cardiovascular manifestations of these common infections and stimulate global collaborations and focused research, and improve awareness on the public health implications.

The second review is on rheumatic heart disease.³ Unlike the other conditions included in this review series, there are number of comprehensive reviews on rheumatic fever and rheumatic heart disease. However, there have been significant recent developments that perhaps merits a focused review. The contemporary concepts on disease biology have changed substantially, largely driven by research deploying cutting-edge technologies. The epidemiology of disease has changed dramatically and is now largely restricted to low-income countries and marginalized sections in other regions. There have been significant advances relating to screening strategies including the use of echocardiography with well-defined criteria. There is new data that supports the use of secondary prophylaxis for latent rheumatic fever. However, despite all of these advances, significant challenges remain in disease control that relate to access to primary care of reasonable quality and availability of penicillin. This review seeks to revisit the “orphan disease” and provide a concise update on the previously mentioned facets of rheumatic fever and rheumatic heart disease.

The third review relates to Takayasu arteritis.⁴ Although relatively less common than the other conditions included in this series, Takayasu arteritis is still an important problem in many tropical countries because it affects younger populations and causes considerable morbidity and premature death that can be averted through a nuanced approach to management. The disease requires a multidisciplinary approach with close collaboration between rheumatologists and cardiologists which has contributed to significantly improved outcomes. This review has been jointly written by rheumatologists and clinical and interventional cardiologists from an institution that has vast experience with managing Takayasu arteritis. It lays a robust framework in disease biology, clinical features and diagnostic criteria, natural history, and contemporary management principles. The management of disease activity through immunosuppression and the timing, scope, and outcomes of

catheter interventions as well as the role of surgical management are discussed in depth.

The final review relates to cardiomyopathies and nutritional heart disease in the tropics.⁵ This review includes diverse chronic conditions that have been traditionally seen in the tropics but are now increasingly encountered in other parts of the world as a result of human migration. The review proposes an approach for adequate diagnostic work-up leading to appropriate care for those with suspected or confirmed tropical cardiomyopathies and nutritional CVD. Included in this review are infections associated with high temperatures, such as Chagas disease. The review also discusses endomyocardial fibrosis that is on a decline in many parts of the world but continues to be occasionally encountered almost exclusively in the tropics. Evolutionary adaptation and genetic variations protect against parasitic infections such as malaria, but have led to hemoglobinopathies, such as thalassemia and sickle cell disease, that are associated with cardiovascular disease. Recent advancements in monitoring patients with hemoglobinopathies have enabled timely institution of iron chelation therapy to prevent myocardial injury. High levels of poverty, malnutrition, and suboptimal access to health care systems predispose populations living in the tropics to various nutritional deficiencies (such as thiamine, selenium, calcium) that are associated with cardiovascular disease. These conditions are discussed in some depth in this review.

This set of reviews seek to bridge an important gap in knowledge because the vast majority of mainstream literature relates to conditions perceived as global cardiovascular priorities. We hope that this unique series will serve to improve awareness and understanding of an important set of neglected conditions that have a devastating impact on the cardiovascular systems of relatively younger populations in a number of tropical countries. A concerted global effort is needed to tackle to combined burden of these conditions.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

ADDRESS FOR CORRESPONDENCE: Dr Raman Krishna Kumar, Pediatric Cardiology, Amrita Institute of Medical Sciences and Research Centre, Amrita Vishwa Vidyapeetham Cochin, 682041, Kerala, India. E-mail: kumar_rk@yahoo.com.

REFERENCES

1. The London School of Tropical Medicine. *The Times*. No. 36874. September 16, 1902;7.
2. Farina JM, Liblik K, Iomini P, et al. JACC focus seminar: tropical medicine: infections and cardiovascular disease. *J Am Coll Cardiol*. 2023;81(1):71-80.
3. Dougherty S, Okello E, Mwangi J, Kumar RK. JACC focus seminar: tropical medicine: rheumatic heart disease. *J Am Coll Cardiol*. 2023;81(1):81-94.
4. Joseph G, Goel R, Thomson VS, Joseph E, Danda D. JACC focus seminar: tropical medicine: Takayasu arteritis. *J Am Coll Cardiol*. 2023;81(2):172-186.
5. Sliwa K, Viljoen CA, Hasan B, Ntusi NAB. JACC focus seminar: tropical medicine: Nutritional heart disease and cardiomyopathies. *J Am Coll Cardiol*. 2023;81(2):187-202.

KEY WORDS cardiomyopathy, nutritional heart disease, rheumatic heart disease, Takayasu arteritis, tropical cardiovascular diseases