

## Cardiac Involvement in Infectious Diseases

João Marcos Bemfica Barbosa Ferreira

Universidade do Estado do Amazonas (UEA), Manaus, AM – Brazil

In the last hundred years, developed countries have undergone a profound transformation in their epidemiological profile, characterized by a progressive drop in infectious and parasitic diseases, and by a rise in chronic-degenerative diseases, particularly of cardiovascular diseases, as the main cause of death. These changes were termed by Omram in 1971 as “epidemiological transition.”<sup>1</sup>

The so-called “developing” countries have also undergone similar transformations. However, in these countries, such as Brazil, a more careful examination of mortality and morbidity data reveals a peculiar picture. Estimates indicate that the prevalence of infectious diseases, such as Chagas’ disease, schistosomiasis, malaria, HIV/AIDS, and others, remains high. By facing the problem of increased morbidity and mortality from chronic-degenerative diseases, Brazil is faced with the persistence or even the resurgence of infectious and parasitic diseases, unlike developed countries, where chronic diseases only came to take a prevailing role after the virtual control of transmissible diseases. In Brazil, there is an epidemiological polarization, with the simultaneous existence of high rates of morbidity and mortality due to chronic-degenerative diseases, and high incidence and prevalence of infectious and parasitic diseases, the mortality from which is still relevant, compared to the rates of developed countries.<sup>1</sup> It is also worth noting the recent downward trend of mortality due to cardiovascular diseases in Brazil, although these still remain the main cause of death in Brazil. There is also an important regional difference in mortality curves from cardiovascular diseases, with higher reduction rates in the South and Southeast Regions and lower rates in the North and Northeast Regions.<sup>2</sup>

Due to the coexistence of chronic-degenerative diseases with infectious diseases in developing countries, it is important to know the impact of infectious diseases on the heart, since this involvement may cause or exacerbate potential cardiac disorders that have not been evaluated in most recent publications.

Among infectious diseases, those caused by arboviruses have emerged in Latin America, Africa and Asia. Diseases like Zika, Chikungunya fever, dengue fever and yellow fever have

become increasingly frequent.<sup>3</sup> The article “Echocardiographic Evaluation of Late Cardiac Issues Caused by the Chikungunya Fever”<sup>3</sup> reports cardiac disorders mainly in the late phase of the Chikungunya fever, such as left ventricular (LV) hypocontractility and dilation, segmental disorders and reduction of LV and left atrial (AE) global longitudinal strain.<sup>4</sup> Other studies also reported severe clinical, electrocardiographic and echocardiographic abnormalities in patients with arboviruses, mainly with Chikungunya fever and dengue fever.<sup>5</sup> Therefore, research on cardiovascular involvement in arboviruses should be encouraged to raise awareness and encourage appropriate diagnosis and treatment.

In addition to the arboviruses, other infectious diseases can occur with cardiac involvement. Alencar-Filho et al.<sup>6</sup> reported severe cardiac disorders in patients with vivax malaria. Laboratory abnormalities, such as high troponin and natriuretic peptides, were more common in the patients studied compared to the control group. Besides, echocardiographic disorders, such as increased LV diastolic and systolic volumes, slightly decreased LV ejection fraction, worsening of right ventricular systolic function and increased pulmonary vascular resistance were observed at the beginning of the treatment of vivax malaria and were reverted after the end of treatment. It is worth mentioning that vivax malaria usually has a less severe clinical course than falciparum malaria, suggesting the need for cardiac evaluation studies also in patients with falciparum malaria.<sup>6</sup> Other infectious diseases also require further research concerning their cardiac involvement, such as viral hepatitis, leishmaniasis, etc.

Another aspect to be explored from the point of view of new research is the evaluation of the cardiovascular involvement of infectious diseases through cardiac strain, a method that can detect earlier changes in myocardial strain. The study “Echocardiographic Evaluation of Late Cardiac Issues Caused by the Chikungunya Fever”<sup>3</sup> also performed cardiac strain, reporting abnormalities in both LV and LA longitudinal strains. Another infectious disease with a high prevalence in Latin America and with many studies related to its cardiac involvement is the Chagas’ disease. Cardiac strain studies have been recently performed in patients with Chagas’ disease with detection of early disorders, even in the early stages of the disease. Gomes et al.<sup>7</sup> observed abnormal global longitudinal strain in the early stages of chronic Chagas’ heart disease, especially when accompanied by fibrosis on cardiac magnetic resonance imaging.<sup>7</sup>

Therefore, in developing countries, where the so-called “modern” diseases, such as chronic-degenerative diseases, are increasingly studied, we cannot forget the still high prevalence of infectious and parasitic diseases and their potential cardiac involvement, which can exacerbate preexisting heart diseases or even cause them.

### Keywords

Echocardiography/methods; Communicable Diseases/ complications; Health Profile; Epidemiology; Multiple Chronic Conditions; Cardiovascular Diseases; Infection.

**Mailing Address:** João Marcos Bemfica Barbosa Ferreira •  
Rua Ramos Ferreira, 199. Postal Code 69010-120, Aparecida, Manaus,  
Amazonas - Brazil  
E-mail: jmbemfica@hotmail.com

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## References

1. Araújo JD. Polarização epidemiológica no Brasil. *Epidemiol Serv Saúde*. 2012;21(4):6-15
2. Guimarães RM, Andrade SS, Machado EL, Bahia CA, Oliveira MM, Jacques FV. Diferenças regionais na transição da mortalidade por doenças cardiovasculares no Brasil, de 1980 a 2012. *Rev Panam Salud Publica*. 2015;37(2):83-9.
3. Marcondes CB, Contigiani M, Gleiser RM. Emergent and reemergent arboviruses in South America and the Caribbean. Why so many and why now? *J Med Entomol*. 2007; 54(3):509-3
4. Del Castillo JM, Alencar GM, Nobrega MV, Mazzarollo C, Diniz JV, Albuquerque ES, et al. "Avaliação ecocardiográfica das alterações cardíacas tardias provocadas pela Febre Chikungunya". *Arq Bras Cardiol: Imagem cardiovasc*. 2018;31(3):183-190
5. Alvarez MF, Bolívar-Mejía A, Rodríguez-Morales AJ, Ramirez-Vallejo E. Cardiovascular involvement and manifestations of systemic Chikungunya virus infection: a systematic review. *F1000 Res*. 2017;6(390):1-22.
6. Alencar-Filho AC, Ferreira JM, Salinas JL, Fabri C, Monteiro WM, Siqueira AM, Okoshi K, Lacerda MV, Okoshi MP. Cardiovascular changes in non-severe *Plasmodium vivax* malária. *Int J Cardiol Heart Vasc*. 2016 March 10;11:12-6.
7. Gomes VA, Alves GF, Hadlich M, Azevedo CF, Pereira IM, Santos CR, et al. Analysis of regional left ventricular strain in patients with Chagas disease and normal left ventricular systolic function. *J Am Soc Echocardiogr*. 2016;29(7):679-88.