

The role of echocardiographic screening in reducing the burden of rheumatic heart disease in Latin America

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ABSTRACT

The objectives of this article are to reflect on the rationale behind the use of echocardiographic screening for rheumatic heart disease and to provide key recommendations about steps needed to implement and improve echocardiographic screening programs in Latin America. Rheumatic heart disease remains a public health problem affecting mainly low-income and lower-middle-income countries and populations. Latin America is an area with economic inequalities, and the epidemiology of rheumatic heart disease remains largely unknown. Echocardiographic screening is useful for updating the epidemiology and providing early diagnosis of the disease. We discuss different approaches used in successful echocardiographic screening programs worldwide and in Latin America. We then identify the key elements needed to establish successful echocardiographic screening programs in Latin America, including increased awareness and involvement from multiple sectors (e.g. the community, health care professionals, scientific organizations and public health entities), identification of areas in need, development of a plan and structure that include different screening approaches, and how to ensure appropriate follow up for those who screen positive.

Keywords

Rheumatic heart disease; heart valve diseases; echocardiography; early diagnosis; Latin America.

Rheumatic heart disease (RHD) is a preventable high-burden disease. It is an unequal public health problem as it mainly affects low-income countries and individuals (1). The impacts of RHD are complications (e.g. heart failure, arrhythmia, infective endocarditis, embolism, stroke and the need for percutaneous or surgical interventions) and premature mortality, specifically in younger populations (1, 2). Recently, the scientific community has developed a renewed interest in RHD (3). This has led to the development of strategies to raise awareness of the disease by scientific and health organizations, including the World Health Organization (1, 2, 4). However, projections indicate that the incidence and prevalence of RHD will continue to increase

until 2030, with notable variations by region, sex and age (5). There are many difficulties in controlling the disease, including diagnostic and therapeutic (e.g. late diagnosis, lack of prophylaxis and access to interventional treatment), inadequate data or a lack of data and, lastly, a lack of awareness among the general population, health care providers, and ministries of health (3). Latin America still has marked socioeconomic inequalities that produce significant barriers to accessing health care (6). This may be why the epidemiology of RHD in Latin America is largely unknown (7). In this article, we briefly discuss the rationale for using echocardiographic screening to detect RHD and review studies, with the objective of proposing the key steps

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needed to successfully establish such screening programs in Latin America.

EPIDEMIOLOGY OF RHEUMATIC HEART DISEASE

Most of the worldwide data on RHD are based on the Global Burden of Disease studies (5, 8). In 2019, 40 million people were estimated to be living with RHD worldwide, with a higher burden in children and adolescents, women aged 15–49 years and countries with lower sociodemographic indexes (8). Furthermore, Hu et al. predict that by 2030, the age-standardized prevalence rate of RHD will reach 559.88 per 100 000 population, with the same distribution affecting the female and younger populations (5). It is important to note that some authors expect that the COVID-19 pandemic has had a negative impact on the diagnosis and prevention of RHD (9).

There is a scarcity of research focused on RHD in Latin America. In our recent systematic review, we summarized data from primary studies on RHD in this region. One of the main findings was the varying prevalence reported, with studies that assessed schoolchildren describing rates of between 0.24 and 48 per 1 000 (7). Furthermore, in a secondary analysis of data from the Global Burden of Disease study, Ordunez et al. identified an age-standardized prevalence of 532.8 per 100 000 population in Latin America and the Caribbean in 2017 (10). However, as previously described by Antunes, the prevalence of RHD is often miscalculated as it is usually based on partial data and not on epidemiological studies, such as data from echocardiographic screening (11).

WHY USE ECHOCARDIOGRAPHIC SCREENING FOR RHEUMATIC HEART DISEASE?

The main goal of using echocardiographic screening is to aid in the early identification of RHD cases (i.e. latent RHD) (2). During the echocardiographic assessment, the morphology and function (e.g. regurgitation or stenosis) of the mitral and aortic valves are evaluated, as detailed in the World Heart Federation (WHF) criteria for diagnosis (12). This screening and potentially early diagnosis could offer a timely opportunity to provide secondary prophylaxis to prevent progression or, if needed, interventional treatment for a patient at a less advanced stage of disease (2, 13, 14). Recently, Beaton et al. conducted a randomized controlled trial in Uganda and found that the use of secondary prophylaxis (i.e. penicillin G benzathine) reduced the risk of progression of disease in children and adolescents with latent RHD (14). An additional benefit of screening is the accurate reflection of the true prevalence of the disease (2, 15). However, there are downsides to the use of population-based echocardiographic screening (15). One of these is the identification of false-positive cases, particularly those that fall into the WHF borderline category (15, 16). Accordingly, some authors, including Hunter et al., have provided approaches to reduce false-positive cases, which may help to optimize screening programs (16).

DIFFERENT APPROACHES TO ECHOCARDIOGRAPHIC SCREENING

It is important to define the strategies or approaches to be used to collect and interpret the images, given that echocardiography requires costly machines and experienced personnel to perform the test and interpret the results. As a result of these

considerations, multiple researchers have tested alternatives, including using less expensive machines (e.g. handheld or portable), having trained non-experts obtain the images and using remote expert review (17, 18).

A meta-analysis compared the use of a handheld device with standard echocardiography and found handheld devices to be a reasonable option, particularly for identifying definite cases of RHD (19). Furthermore, training non-experts to obtain images (e.g. nurses and general practitioners) has been found to be an option for echocardiographic screening (17, 20). Recently, Francis et al. compared two different approaches to using echocardiography to identify RHD (i.e. echocardiography performed by a non-expert with subsequent referral of abnormal cases versus echocardiography performed by a non-expert with the image reviewed by an expert remotely) and found that both had similar sensitivity, but specificity was significantly improved with remote expert review (17).

SCREENING PROGRAMS WORLDWIDE AND IN LATIN AMERICA

There have been multiple successful screening programs in Africa, Asia and Oceania (21–23). For instance, Ali and Subahi detailed a program to screen for and control RHD in Sudan (21). These authors developed a framework for a program that included surveillance, RHD registries and echocardiographic screening. As part of their project, children in five different states in Sudan were screened with handheld echocardiography devices to identify the prevalence of RHD and areas with higher needs (21).

A few RHD studies based on echocardiographic diagnosis have been published in Latin America (7), with the most recent being the *Programa de Rastreamento da Valvopatia Reumática* (PROVAR) study in Brazil (20). This is the first large-scale screening program for RHD in South America and is based on a collaboration between researchers from Brazil and the United States (20). Briefly, Nascimento et al. assessed more than 12 000 children in public and private schools and primary care centers, and identified 4.0% of children as having borderline RHD and 0.5% as definite cases. They used trained non-experts and handheld devices to obtain images that were subsequently reviewed by experts using telemedicine; positive cases were provided with follow-up care in referral centers (20).

ARE ECHOCARDIOGRAPHIC SCREENING PROGRAMS COST EFFECTIVE?

A key factor in implementing any program is its cost-effectiveness, and this is particularly true in Latin America, where there are marked inequalities in access to health care (6). Researchers from the PROVAR study group assessed the cost-effectiveness of their program in Brazil (24). Their findings indicate that screening for RHD in an underserved population in Brazil was cost effective (24). Despite this, cost-effectiveness data are difficult to extrapolate to other countries, and further studies will be needed to assess this going forward.

THE IMPORTANCE OF PRIMARY CARE IN CONTROL AND SCREENING

Primary care is a fundamental pillar of the control of RHD. A robust primary care structure is needed for better detection

and to provide better care for patients living with RHD (2, 25, 26). The role of primary care in RHD includes disease surveillance (15) and primary and secondary prevention (25). Scheel et al. describe the importance of surveillance and screening for RHD in patients attending for primary care in endemic areas (15). Moreover, the PROVAV study in Brazil identified higher participation rates for echocardiographic screening in the primary care setting and in private schools rather than in public schools (20).

HOW CAN SCREENING BE IMPROVED IN LATIN AMERICA?

After reviewing successful experiences in implementing echocardiographic screening programs worldwide and in Latin America (20–23), we believe there must be a joint effort to achieve the goal of reducing the impact of RHD. We propose the following key steps that may help create and strengthen RHD screening programs in Latin America (Table 1).

First, it is important to increase awareness of the disease among the community and medical professionals. Community education is an influential factor in any RHD control program (25). Furthermore, the WHF’s Tools for Implementing RHD Control Programs (known as Quick TIPS) underscore the importance of informed health care workers, including primary care providers and medical specialists (e.g. pediatricians, cardiologists and cardiovascular surgeons), for achieving successful control of RHD (1, 25).

Second, increasing the interest and involvement of stakeholders, public health entities and nongovernmental and governmental organizations, including ministries of health, is essential to further support the establishment of these programs (1, 25, 26).

Third, increasing the interest of and initiatives from scientific organizations will also be important; these organizations include national and international cardiology and cardiovascular surgery associations (25, 26).

Fourth, identifying areas where implementation of screening programs should be prioritized will also be important (25). This issue prompts the recognition of other needs in Latin America – that is, the need for updated epidemiological data and registries (1, 7, 25).

Fifth, it will also be essential to identify and plan the structure, personnel and pathways needed for the program’s success and, importantly, it may be helpful to emulate strategies that have been implemented by others. These strategies may include training for non-expert workers and the use of

handheld devices and telemedicine for remote expert review (17, 19, 20).

Sixth, it will be necessary to have a plan, structure and supplies in place to provide the appropriate follow up for people with positive findings, including the necessary treatment, such as secondary antibiotic prophylaxis, and any additional follow up required. These steps have been described by publications including the WHF Roadmap (26) and the Quick TIPS (25), which highlight the importance of providing the clinical care needed after screening, including for incidental findings.

Conclusions

The use of echocardiographic screening should be seen as a key factor in controlling RHD. It can provide epidemiological information and, more importantly, a window of opportunity for a timely diagnosis and treatment to reduce the progression and complications of the disease. Experiences of these programs worldwide and in Latin America may serve as examples of what is needed to execute them successfully. We have identified the key factors that need to be considered to establish echocardiographic screening in Latin America. These include increasing disease awareness among the community, health care workers and stakeholders; identifying areas in greatest need; identifying an approach to be used for screening; and ensuring there is an appropriate care pathway for follow up of patients with RHD. These screening programs should have the ultimate goal of reducing the burden of RHD in Latin America.

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TABLE 1. Key steps necessary to establish screening programs for rheumatic heart disease in Latin America

Step	References
Increase awareness among the community and health care workers.	1, 21, 25
Promote interest and involvement among stakeholders, public health entities and nongovernmental and governmental organizations, including ministries of health.	1, 25, 26
Encourage the participation of scientific associations and organizations.	25, 26
Identify populations and geographical areas with higher needs so they can be prioritized.	1, 7, 25
Establish the structure and approach of and the personnel who will implement the echocardiographic screening program.	17, 19, 20
Ensure the availability of the appropriate resources for secondary prevention, treatment and follow up of identified cases.	25, 26

Source: Table developed by the authors based on the cited references.

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El papel del tamizaje ecocardiográfico en la reducción de la carga de la cardiopatía reumática en América Latina

RESUMEN

Los objetivos de este artículo son reflexionar sobre los fundamentos que justifican el uso del tamizaje ecocardiográfico para detectar la cardiopatía reumática y ofrecer algunas recomendaciones importantes sobre los pasos que habría que dar para poner en marcha programas de tamizaje ecocardiográfico y mejorar los existentes en América Latina. La cardiopatía reumática sigue siendo un problema de salud pública que afecta principalmente a países y grupos poblacionales de ingresos bajos y medianos bajos. América Latina es una región de grandes desigualdades económicas y las características epidemiológicas de la cardiopatía reumática siguen siendo desconocidas en gran medida. El tamizaje ecocardiográfico resulta útil para actualizar los datos epidemiológicos y posibilitar un diagnóstico temprano de la enfermedad. En este artículo se analizan los diferentes enfoques empleados en algunos programas de tamizaje ecocardiográfico eficaces de distintas partes del mundo, incluida América Latina. A continuación se determinan los elementos clave necesarios para establecer programas eficaces de tamizaje ecocardiográfico en América Latina, incluida una mayor concientización y participación de diversos sectores (p. ej., la comunidad, los profesionales de salud, las organizaciones científicas y las entidades de salud pública), la identificación de las zonas más necesitadas, la elaboración de un plan y una estructura que incluyan diferentes abordajes del tamizaje, y el modo de garantizar un seguimiento adecuado de aquellas personas con un resultado positivo en el tamizaje.

Palabras clave

Cardiopatía reumática; enfermedades de las válvulas cardíacas; ecocardiografía; diagnóstico precoz; América Latina.

O papel da triagem ecocardiográfica na redução da carga de doença cardíaca reumática na América Latina

RESUMO

Os objetivos deste artigo são oferecer observações sobre a fundamentação do uso da triagem ecocardiográfica para doença cardíaca reumática e fornecer recomendações importantes sobre as etapas necessárias para implementar e melhorar os programas de triagem ecocardiográfica na América Latina. A doença cardíaca reumática continua sendo um problema de saúde pública que afeta principalmente países e populações de renda baixa e média-baixa. A América Latina é uma área com desigualdades econômicas, e a epidemiologia da doença cardíaca reumática continua amplamente desconhecida. A triagem ecocardiográfica serve para atualizar a epidemiologia e proporcionar o diagnóstico precoce da doença. Examinamos as diferentes abordagens usadas em programas de triagem ecocardiográfica bem-sucedidos em todo o mundo e na América Latina. Em seguida, identificamos os principais elementos necessários para estabelecer programas de triagem ecocardiográfica com sucesso na América Latina. Tais programas incluiriam maior conscientização e envolvimento de vários setores (por exemplo, a comunidade, profissionais de saúde, organizações científicas e entidades de saúde pública), identificação de áreas carentes, desenvolvimento de um plano e estrutura abrangendo diferentes abordagens de triagem e formas de garantir o acompanhamento adequado de pessoas com resultado positivo na triagem.

Palavras-chave

Cardiopatía reumática; doenças das valvas cardíacas; ecocardiografia; diagnóstico precoce; América Latina.
