

Impact of Rheumatic Fever on the Cardiovascular System: Modern Approaches to Diagnosis and Treatment

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Article History	Abstract
Received: 7 th March 2026 Accepted: 6 th April, 2026	Rheumatic fever is an autoimmune inflammatory disease that develops following pharyngeal infection caused by Group A β -hemolytic Streptococcus, with cardiovascular involvement representing its most severe complication. The pathogenesis of the disease is primarily based on the mechanism of molecular mimicry, whereby antibodies and T lymphocytes generated against streptococcal antigens cross-react with myocardial, endocardial, and valvular tissues, leading to immune-mediated cardiac damage. This article analyzes the mechanisms through which rheumatic fever affects the cardiovascular system, the stages of rheumatic carditis, morphological and functional alterations of the cardiac valves, and the long-term hemodynamic consequences of the disease. Furthermore, the diagnostic value of clinical -manifestations, laboratory investigations, and instrumental examinations including echocardiography, electrocardiography, inflammatory biomarkers, and serological markers confirming streptococcal infection - is comprehensively discussed. The article also reviews contemporary therapeutic strategies, including antibacterial therapy, anti-inflammatory treatment, management of heart failure, secondary prophylaxis, and evidence-based approaches for the prevention of rheumatic heart disease in accordance with current international recommendations. Early diagnosis and comprehensive

	management of rheumatic fever are essential for preventing valvular heart disease, chronic heart failure, and long-term disability, thereby improving cardiovascular outcomes and patients' quality of life.
Keywords: Rheumatic fever, Rheumatic heart disease, Cardiovascular system, Rheumatic carditis, Group A β -hemolytic Streptococcus, Molecular mimicry, Valvular heart disease, Echocardiography, Heart failure, Secondary prophylaxis, Autoimmune inflammation, Early diagnosis.	

Introduction; Rheumatic fever is a systemic autoimmune inflammatory disease that develops 2–4 weeks after acute pharyngitis or tonsillitis caused by Group A β -hemolytic Streptococcus (*Streptococcus pyogenes*). The disease primarily affects the heart, joints, central nervous system, and skin. The most serious and long-term complication is rheumatic carditis, which may progress to rheumatic heart disease (RHD). Inflammatory involvement of the myocardium, endocardium, and pericardium (pancarditis), together with fibrosis, thickening, and deformation of the cardiac valves, can result in acquired valvular lesions such as mitral and aortic stenosis or regurgitation. According to the World Health Organization, rheumatic heart disease remains a significant cause of cardiovascular morbidity and premature mortality, particularly among children and adolescents in low- and middle-income countries. The high prevalence of the disease is largely associated with untreated or inadequately treated streptococcal infections, limited access to healthcare services, and insufficient implementation of secondary prophylaxis. Although considerable progress has been made in understanding the immunopathogenesis, diagnosis, and management of rheumatic fever, early detection and prevention of permanent valvular damage remain major clinical challenges. Therefore, the aim of this article is to analyze the mechanisms by which rheumatic fever affects the cardiovascular system, as well as to review current diagnostic methods, therapeutic strategies, and preventive approaches based on contemporary scientific evidence.

Materials and Methods; This study was conducted as a narrative literature review focusing on the cardiovascular effects of rheumatic fever. A comprehensive analysis of national and international scientific publications was performed to evaluate the etiology, pathogenesis, clinical manifestations, diagnostic approaches, and current treatment strategies for rheumatic fever and

rheumatic heart disease. The review included recently published peer-reviewed articles, systematic reviews, meta-analyses, and international clinical guidelines issued by the World Health Organization (WHO), the American Heart Association (AHA), and the European Society of Cardiology (ESC).

The literature selection process emphasized the relevance, scientific validity, and clinical significance of studies addressing rheumatic fever, rheumatic carditis, rheumatic heart disease, valvular involvement, echocardiographic assessment, and contemporary therapeutic approaches. The collected data were analyzed using comparative, descriptive, and integrative methods to identify the major mechanisms of cardiovascular involvement, diagnostic advances, and evidence-based treatment strategies. The findings of this review provide a comprehensive overview of the impact of rheumatic fever on the cardiovascular system and highlight current approaches to its diagnosis, management, and prevention.

Results; The literature review demonstrated that the most severe and clinically significant complication of rheumatic fever is cardiovascular involvement, primarily manifested as rheumatic carditis, which may subsequently progress to rheumatic heart disease (RHD). The principal pathogenic mechanism is molecular mimicry, in which the immune response directed against Group A β -hemolytic *Streptococcus* cross-reacts with cardiac proteins, including myosin, laminin, and valvular endothelial tissue. This autoimmune reaction induces inflammatory damage to the myocardium, endocardium, and pericardium, leading to the formation of Aschoff bodies, followed by fibrosis and structural deformation of the cardiac valves.

Analysis of the reviewed studies indicated that the mitral valve is the most frequently affected cardiac valve, followed by the aortic valve. Progressive valvular damage may result in mitral or aortic stenosis and regurgitation, cardiac chamber enlargement, chronic heart failure, cardiac arrhythmias, pulmonary hypertension, and thromboembolic complications, significantly increasing long-term morbidity and mortality. The findings further confirmed that echocardiography remains the most sensitive and reliable imaging modality for the early detection of rheumatic carditis and subclinical valvular lesions. Laboratory investigations demonstrated elevated levels of C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and antistreptolysin O (ASO) antibodies, which serve as important indicators of active inflammatory and post-streptococcal immune responses. Early initiation of appropriate antibiotic

therapy, anti-inflammatory treatment, and long-term benzathine penicillin secondary prophylaxis was consistently associated with a reduced risk of recurrent rheumatic fever, progression of valvular heart disease, and the development of chronic cardiovascular complications.

Discussion; The findings of this literature review confirm that the cardiovascular manifestations of rheumatic fever are mediated by complex immunopathological mechanisms. Molecular mimicry plays a central role in disease pathogenesis, whereby antibodies and T lymphocytes generated against Group A β -hemolytic Streptococcus cross-react with cardiac tissues, resulting in progressive inflammation and irreversible damage to the valvular apparatus. This mechanism has been consistently recognized as the principal pathogenic pathway leading to the development of rheumatic heart disease (RHD). The reviewed evidence also highlights the crucial role of echocardiography in detecting both clinical and subclinical rheumatic carditis. Modern Jones Criteria recommend the incorporation of echocardiographic findings into the diagnostic process, allowing earlier identification of valvular involvement even in asymptomatic patients. Early diagnosis facilitates timely therapeutic intervention and significantly reduces the risk of permanent valvular damage and subsequent cardiovascular complications. Furthermore, current evidence demonstrates that prompt treatment of streptococcal pharyngitis with appropriate antibiotics, together with long-term benzathine penicillin G secondary prophylaxis, markedly decreases the recurrence of rheumatic fever and limits the progression of rheumatic heart disease. These strategies contribute to reducing the incidence of chronic heart failure, the need for valve replacement surgery, and long-term disability while improving overall patient prognosis and quality of life. Therefore, effective management of rheumatic fever requires early diagnosis, continuous follow-up of high-risk patients, widespread use of modern diagnostic techniques, and adherence to evidence-based international clinical guidelines. A comprehensive multidisciplinary approach remains essential for preventing irreversible valvular damage, minimizing cardiovascular complications, and improving long-term clinical outcomes.

Conclusion; Rheumatic fever remains a major public health concern because of its significant impact on the cardiovascular system and its potential to cause irreversible valvular heart disease. Autoimmune-mediated inflammation following Group A β -hemolytic Streptococcus infection primarily affects the

cardiac valves, leading to progressive structural and functional abnormalities that may culminate in chronic heart failure and other severe cardiovascular complications. Advances in diagnostic techniques, particularly the widespread use of echocardiography and updated Jones Criteria, have substantially improved the early detection of rheumatic carditis and subclinical valvular lesions. Timely diagnosis, prompt antibiotic therapy, appropriate anti-inflammatory treatment, and long-term benzathine penicillin G secondary prophylaxis are essential for preventing disease recurrence and limiting the progression of rheumatic heart disease. In conclusion, effective prevention and management of rheumatic fever require an integrated approach involving early recognition, accurate diagnosis, evidence-based treatment, and continuous secondary prophylaxis. Strengthening awareness among healthcare professionals and improving access to early diagnostic and preventive strategies are crucial for reducing the global burden of rheumatic heart disease and improving long-term cardiovascular outcomes.

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