International Clinical and Medical Case Reports
2024 Volume 3, Issue 2
DOI: 10.59657/2837-5998.brs.24.044

BioRes Scientia
Value your Research

Research Article

Open Access

Cardiovascular Complications in Systemic Diseases: A Comprehensive Literature Review

A. El Bouazizi, L. Afendi, F. Essadqi, M. Bouziane, M. Haboub, S. Arous, G. Bennouna, A. Drighil, R. Habbal

Moulay Ismail University of Meknes, Morocco.
**Corresponding author: Asmaa El Bouazizi.*

Abstract

Systemic diseases, which affect multiple organs and systems in the body, are often associated with cardiovascular complications.

Keywords: cardiovascular; systemic diseases; rheumatoid arthritis; diabetes mellitus; hyperthyroidism

Introduction

The underlying mechanisms linking these diseases to cardiac involvement vary depending on the nature of the systemic disease. This study examines the relationships between certain systemic diseases (systemic lupus erythematosus, rheumatoid arthritis, diabetes mellitus, hyperthyroidism, HIV, and hepatitis C) and cardiovascular complications by identifying the specific mechanisms involved.

Methods

For this literature review, a systematic search was conducted in the PubMed, Google Scholar, and Cochrane Library databases. Studies published between 2010 and 2023 were included. Keywords used included "systemic diseases," "cardiac involvement," "systemic lupus erythematosus," "rheumatoid arthritis," "diabetes mellitus," "hyperthyroidism," "HIV," and "hepatitis C." Selected articles had to report relevant clinical or epidemiological data and be published in peer-reviewed journals.

Results

Systemic Lupus Erythematosus (SLE)

Cardiovascular Complications: Premature atherosclerosis, myocarditis, pericarditis, valvular heart disease.

Mechanisms

Systemic inflammation: Chronic inflammation due to SLE leads to endothelial damage, promoting the development of atherosclerotic plaques.

Autoimmunity: The presence of autoantibodies and immune complexes can cause direct damage to cardiac tissues.

Immunosuppressive treatments: Although necessary to control the disease, these treatments can increase the risk of opportunistic infections and other cardiovascular complications [1].

Rheumatoid Arthritis (RA)

Cardiovascular Complications: Coronary artery disease, heart failure, accelerated atherosclerosis.

Mechanisms

Systemic inflammation: Elevated levels of pro-inflammatory cytokines, such as TNF-α and IL-6, increase the risk of developing atherosclerotic plaques.

Endothelial dysfunction: Chronic inflammation damages the vascular endothelium, facilitating plaque formation and thrombosis [2].

Treatments: Some treatments, such as NSAIDs and corticosteroids, may have cardiovascular side effects, although other biologic treatments may mitigate the risks.

Diabetes Mellitus

Cardiovascular Complications: Ischemic heart disease, diabetic cardiomyopathy, heart failure, myocardial infarction.

Mechanisms

Chronic hyperglycemia: Leads to glycation of proteins and lipids, increasing oxidative stress and vascular inflammation.

Insulin resistance: Associated with dyslipidemia and hypertension, increasing the risk of heart disease.

Metabolic alterations: Metabolic imbalances directly affect myocardial and vascular function [3].

Hyperthyroidism

Cardiovascular Complications: Atrial fibrillation, dilated cardiomyopathy, heart failure.

Mechanisms

Excess thyroid hormones: Increase cardiac metabolism, leading to tachycardia and ventricular hypertrophy.

Chronotropic and inotropic effects: Thyroid hormones increase contractility and heart rate, overloading the heart.

Inflammation: Thyroid inflammation can also contribute to cardiac complications [4].

HIV

Cardiovascular Complications: Dilated cardiomyopathy, accelerated atherosclerosis, myocardial infarction.

Mechanisms

Chronic systemic inflammation: HIV infection causes chronic immune activation, promoting atherosclerosis.

Antiretroviral therapy side effects: Some antiretroviral drugs can cause dyslipidemia and insulin resistance, increasing cardiovascular risks.

Co-infections and comorbidities: Co-infections such as hepatitis B or C also increase the risk of cardiovascular complications [5].

Hepatitis C

Cardiovascular Complications: Ischemic heart disease, cerebrovascular diseases.

Mechanisms

Systemic inflammation: Chronic hepatitis C infection leads to systemic inflammation that can damage blood vessels.

Dyslipidemia: Hepatitis C can cause lipid abnormalities that contribute to atherosclerosis.

Direct effects of the virus: The hepatitis C virus can also directly affect endothelial and myocardial cells [6].

Discussion

Systemic diseases lead to cardiovascular complications through various mechanisms, including chronic inflammation, endothelial dysfunction, metabolic alterations, and treatment side effects. Clinicians need to be aware of these interactions to improve the prevention and management of cardiovascular diseases in patients with systemic diseases.

Systemic Lupus Erythematosus (SLE)

Chronic inflammation plays a central role in the cardiovascular complications of SLE. Roman et al. (2006) showed that premature atherosclerosis in SLE patients is due to a combination of inflammatory and immunological factors [1]. Immunosuppressive treatments, while effective in controlling disease activity, can also predispose patients to opportunistic infections and increase the risk of cardiovascular complications. Studies suggest that therapeutic approaches specifically targeting inflammatory pathways could reduce cardiovascular risk in this population.

Rheumatoid Arthritis (RA)

RA is another autoimmune disease where systemic inflammation is a major risk factor for cardiovascular diseases. Aviña-Zubieta et al. (2008) reported that RA patients have almost twice the risk of cardiovascular mortality compared to the general population [2]. Biologic treatments targeting pro-inflammatory cytokines, such as TNF-α, have shown benefits not only on joint symptoms but also on cardiovascular risk markers. However, the prolonged use of corticosteroids and NSAIDs can have adverse effects on the cardiovascular system, highlighting the need for balanced management strategies.

Diabetes Mellitus

Type 2 diabetes is well established as a major risk factor for cardiovascular diseases. Metabolic alterations, such as hyperglycemia and insulin resistance, contribute to endothelial dysfunction and the progression of atherosclerosis. ESC guidelines (2013) recommend strict glycemic control to reduce the risk of cardiovascular complications in diabetic patients [3]. Integrated approaches combining the management of glycemia, lipids, and blood pressure are necessary to optimize cardiovascular outcomes.

Hyperthyroidism

The cardiac effects of hyperthyroidism are well documented, with complications such as atrial fibrillation and dilated cardiomyopathy being common. Klein and Danzi (2007) showed that treating hyperthyroidism can reverse some cardiovascular complications, although severe damage may persist [4]. Optimal management of hyperthyroidism requires close monitoring of cardiac function and early intervention to prevent serious complications.

HIV

HIV infection and its antiretroviral treatment are associated with an increased risk of cardiovascular complications. Freiberg et al. (2013) showed that

HIV-infected patients have a threefold higher risk of myocardial infarction compared to the uninfected population [5]. Chronic systemic inflammation and metabolic effects of antiretrovirals contribute to this risk. Strategies to reduce inflammation and manage treatment side effects are essential to improve cardiovascular health in these patients.

Hepatitis C

Hepatitis C is associated with an increased risk of cardiovascular diseases, particularly ischemic heart disease. Ambrosino et al. (2016) showed that hepatitis C patients have a 30% increased risk of cardiovascular diseases compared to the general population [6]. Systemic inflammation, lipid abnormalities, and direct viral effects on endothelial and myocardial cells are potential mechanisms. Effective antiviral treatment and management of cardiovascular risk factors are crucial for these patients.

Conclusion

This review highlights the various ways in which systemic diseases can lead to cardiovascular complications. A thorough understanding of the pathogenic mechanisms is essential for developing effective therapeutic strategies and reducing morbidity and mortality in these patients.

References

1. Roman, M. J., Shanker, B.-A., Davis, A., Lockshin, M. D., Sammaritano, L., Simantov, R., ... & Crow, M. K. et al. (2006). Prevalence and correlates of accelerated atherosclerosis in systemic lupus erythematosus. *New England Journal of Medicine*., 349(25); 2399-2406.
2. Aviña-Zubieta, J. A., Choi, H. K., Sadatsafavi, M., Etminan, M., Esdaile, J. M., & Lacaille, D. et al. (2008). Risk of cardiovascular mortality in patients with rheumatoid arthritis: a meta-analysis of observational studies. *Arthritis and Rheumatism*., 59(12); 1690-1697.
3. Ryden, L., Grant, P. J., Anker, S. D., Berne, C., Cosentino, F., Danchin, N., et al. (2013). Task Force on diabetes, pre-diabetes, and cardiovascular diseases of the European Society of Cardiology (ESC). ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD. *European Heart Journal*., 34(39); 3035-3087.
4. Klein, I., & Danzi, S. (2007). Thyroid disease and the heart. *Circulation*, 116(15); 1725-1735.
5. Freiberg, M. S., Chang, C. C. H., Kuller, L. H., Skanderson, M., Lowy, E., Kraemer, K. L., ... & Justice, A. C. et al. (2013). HIV infection and the risk of acute myocardial infarction. *JAMA Internal Medicine*., 173(8); 614-622.
6. Ambrosino, P., Lupoli, R., Di Minno, A., Tarantino, L., Spadarella, G., Tarantino, P., & Di Minno, M. N. D. Et al. (2016). The risk of coronary artery disease and cerebrovascular disease in patients with hepatitis C: A systematic review and meta-analysis. *International Journal of Cardiology*., 221 ; 746-754.

Cite this article: A. El Bouazizi, L. Afendi, F. Essadqi, M.Bouziane, M.Haboub, S. Arous. et al. (2024). Cardiovascular Complications in Systemic Diseases: A Comprehensive Literature Review. *International Clinical and Medical Case Reports,* BioRes Scientia Publishers 3(2):1-3. DOI: 10.59657/2837-5998.brs.24.044

Article History: **Received:** August 16, 2024 | **Accepted:** August 29, 2024 | **Published:** September 10, 2024