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PREVENTION OF ATRIAL FIBRILLATION: CONTEMPORARY APPROACHES AND FUTURE PERSPECTIVES

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Abstract: Atrial fibrillation (AF) is the most common cardiac arrhythmia in clinical practice and is associated with a significantly increased risk of thromboembolic events, heart failure and mortality. The aim of this review is to summarize contemporary approaches to AF prevention, highlighting the importance of modifying risk factors and future prospects for managing the condition. An analysis of recent literature reveals that lifestyle interventions, such as regular moderate physical activity, smoking cessation and moderate alcohol consumption, are fundamental to reducing the risk of AF. Adequate control of comorbidities, such as diabetes mellitus and metabolic syndrome, also plays a crucial role in primary prevention. In addition, emerging pharmacological therapies, such as SGLT-2 inhibitors and GLP-1 agonists, have shown benefits in reducing the risk of AF. An integrated and personalized approach, combined with advances in pharmacological therapies, represents a promising strategy for the prevention of AF, contributing to improved clinical outcomes and quality of life for patients.

Keywords: Atrial fibrillation; Prevention; Risk factors; Lifestyle; Pharmacological therapies; Personalized approach.

INTRODUCTION

Atrial fibrillation (AF) is the most prevalent clinically significant cardiac arrhythmia in clinical practice and is associated with a significant increase in the risk of stroke, heart failure and mortality. The growing prevalence of AF is a significant challenge for health systems globally, and it is estimated that more than 50 million individuals will be affected by this condition in 2020. The increased longevity of the population, the growing incidence of cardiovascular risk factors such as obesity, type 2 diabetes mellitus and hypertension, and the improvement in diagnostic methods all contribute to the rise in the number of cases.

(JOGLAR et al., 2024; O'KEEFE et al., 2021)

AF is associated with a significant economic burden, with substantially higher annual healthcare costs when compared to individuals without the arrhythmia. US data indicate that patients with AF have average annual costs of US\$ 63,031, representing an increase of US\$ 27,896 compared to those without the condition. (JOGLAR et al., 2024) In addition, the presence of AF increases the risk of hospitalizations and emergency department visits, particularly when associated with decompensated heart failure, resulting in a worse prognosis and higher short-term mortality. (NIFORATOS et al., 2023).

The management of AF involves strategies aimed at controlling the heart rate, controlling the rhythm and preventing thromboembolic events. However, current therapeutic approaches, such as electrical cardioversion, antiarrhythmic drugs, catheter ablation and anticoagulation, are often associated with high costs and risks of complications. (O'KEEFE et al., 2021) In this context, the implementation of preventive strategies and the modification of risk factors have become fundamental aspects in the contemporary approach to AF.

Lifestyle changes have been shown to be effective in the primary and secondary prevention of AF. Strict control of hypertension, particularly with inhibitors of the renin-angiotensin-aldosterone system, weight loss in obese individuals, treatment of obstructive sleep apnea and abstinence from alcohol are all proven to be beneficial in reducing the incidence and recurrence of arrhythmia. In addition, moderate physical activity, adequate stress management and adherence to the Mediterranean diet have been associated with a lower risk of AF. (O'KEEFE et al., 2021)

Despite advances in the understanding of pathophysiology and therapeutic interventions, AF continues to represent a challenge in clinical practice. Future prospects include the

development of new pharmacological therapies, such as sodium-glucose cotransporter-2 inhibitors and glucagon-like peptide-1 agonists, which have shown potential in reducing the risk of AF. (O'KEEFE et al., 2021) Thus, the integrated approach combining prevention, risk factor modification and personalized therapeutic interventions stands out as the most promising strategy in reducing the global impact of AF.

METHODOLOGY

This study consists of a bibliographic review with the aim of synthesizing the most recent information on the prevention of atrial fibrillation, addressing contemporary strategies and future perspectives. The bibliographic search was carried out in the PubMed database, using the descriptors 'Atrial Fibrillation' and 'Prevention'. Articles published in the last five years were included, prioritizing those that presented original studies, systematic reviews and clinical trials that addressed the most recent interventions in the management of atrial fibrillation. The exclusion criteria involved disregarding articles that did not meet the inclusion requirements, such as those that were not available in the PubMed database, duplicate articles and studies that did not present information relevant to the subject. The articles were rigorously selected to ensure that the most relevant and up-to-date publications were included. This systematic approach was adopted to ensure transparency and reproducibility of the selection process, providing a comprehensive and critical analysis of the available scientific literature.

RESULTS AND DISCUSSION

The prevention and treatment of atrial fibrillation (AF) have been consolidated as fundamental pillars in the contemporary approach to cardiovascular diseases, especially given the growing epidemiological impact of this arrhythmia. Analysis of modifiable risk factors reveals the importance of lifestyle in the primary prevention of AF. Physical exercise has a two-dimensional relationship with the risk of AF. Evidence shows that light to moderate physical activity, such as walking, is associated with a lower incidence of AF, with a progressive protective effect as intensity and regularity increase. In contrast, strenuous and prolonged resistance training can increase the risk of AF, especially in young or middle-aged individuals, due to the structural and functional cardiac changes induced, such as atrial fibrosis and increased oxidative stress. (O'KEEFE et al., 2021) This relationship is represented by a U-shaped curve, in which moderate amounts of exercise promote benefits, while the opposite extremes - sedentary lifestyle or excessive effort - increase the risk.

Controlling metabolic comorbidities is another important aspect of AF prevention. Patients with diabetes mellitus (DM) have a 35% higher risk of developing AF compared to healthy individuals, and the risk is even more pronounced in the presence of renal complications and inadequate glycemic control. Metabolic syndrome, which includes abdominal obesity, hypertension, dyslipidemia and hyperglycemia, is also associated with a significant increase in the incidence of AF. The use of hypoglycemic agents such as sodium-glucose cotransporter type 2 (SGLT-2) inhibitors and glucagon-like peptide type 1 (GLP-1) agonists has been shown to reduce the risk of AF. Randomized clinical trials, such as SUSTAIN-6, have shown a 29% reduction in the incidence of AF with the use of semaglutide, while recent meta-analyses have shown a 24% reduction

with SGLT-2 inhibitors. (O'KEEFE et al., 2021)

Another modifiable risk factor is excessive alcohol consumption, which contributes to up to 10% of AF cases. Alcohol has direct cardiotoxic effects, such as myocardial inflammation, increased sympathetic tone and left atrial dilation, as well as being associated with other predisposing factors, such as obstructive sleep apnea, hypertension and abdominal obesity. (O'KEEFE et al., 2021) Moderate alcohol consumption or abstinence has been recommended as a preventive measure in the population at risk.

Risk factor modification strategies, known as lifestyle risk factor modification (LRFM), have proven to be fundamental in reducing the risk of AF and improving clinical outcomes. The adoption of a physically active lifestyle, weight loss in obese individuals, smoking cessation, strict blood pressure control and proper diabetes management are recommended approaches to minimize the risk of AF and its complications. (JOGLAR et al., 2024)

The results show that lifestyle and metabolic control interventions not only reduce the risk of developing AF, but also contribute to improving clinical outcomes in patients who have already been diagnosed. The implementation of these approaches should be integrated into AF management guidelines, with a view to promoting cardiovascular health and reducing the disease burden in the population. The combination of lifestyle changes, optimization of pharmacological treatment and continuous clinical follow-up represents the most promising approach to AF management from a contemporary perspective.

CONCLUSION

Atrial fibrillation (AF) is a condition of great clinical relevance, associated with complications such as thromboembolic events and heart failure, making its prevention an essential element in the management of cardiovascular health. This study reinforces the importance of changing risk factors, highlighting that lifestyle interventions such as moderate physical activity, weight control, smoking cessation and reducing alcohol consumption are strategies to minimize the risk of developing arrhythmia. In

addition, proper management of comorbidities, such as hypertension and diabetes, plays a key role in reducing the incidence of AF.

By emphasizing the importance of prevention and early treatment, this study provides input for public health policies and for raising public awareness of measures that can reduce the burden of AF. In this way, investing in prevention not only improves patients' quality of life, but also reduces the socio-economic impacts associated with this condition, making this approach fundamental for the future

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