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Lifestyle Modification in the Prevention and Treatment of Atrial Fibrillation

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ARTICLE INFO

Keywords:
Atrial fibrillation
Obesity
Obstructive sleep apnea
Hypertension
Diabetes mellitus

ABSTRACT

Atrial fibrillation (AF) is the most common arrhythmia worldwide and has a significant impact on morbidity and mortality. Additionally, the incidence and prevalence of AF is expected to increase in the United States and worldwide over the next few decades. While the pathophysiology concerning the development of AF is not completely understood, multiple modifiable, as well as non-modifiable risk factors, for AF development have been discovered. The goal of this paper is to provide an overview of the modifiable risk factors that contribute to the development and recurrence of AF, in addition to discussing potential lifestyle changes that may aid in the prevention and treatment of AF.

Atrial fibrillation (AF) is the most common sustained heart rhythm disorder, affecting approximately 1% of the world's population[1] possessing a 25% lifetime risk of AF in the United States.[2] Also, AF has a significant impact on morbidity and mortality, and significantly contributes to the disease burden due to symptoms, hospitalizations, and stroke.[3,4]

The prevalence of AF in the United States is expected to increase from 5.2 million in 2010 to 12.1 million cases in 2030, owing largely to the expected increase in the incidence of AF from 1.2 million cases in 2010 to 2.6 million cases in 2030.[3] Furthermore, the estimated increase in the number of elderly individuals in the US over the next few decades most likely also contributes to the projected increase in the prevalence of AF. The age-adjusted prevalence of AF is more common in men than in women[4] and in Caucasians than in African Americans.[5] The prevalence of AF increases with increasing age, and it has been estimated that approximately 70% of individuals with AF are between the ages of 65 and 85.[6] In addition to the increased prevalence of AF with advancing age, the risk of stroke with AF also increases with increasing age. Evidence demonstrates that there is a steep increase in the risk of stroke in patients with AF ranging from 1.5% at age 50-59 years to 23.5% at age 80–89.[7]

While certain risk factors/conditions, such as increasing age, sleep apnea, type 2 diabetes mellitus (T2DM), obesity, alcohol consumption, hypertension (HTN), heart failure (HF), coronary heart disease (CHD), chronic excessive strenuous endurance exercise, and valvular heart disease (VHD) have been associated with the development of AF, in some patients the underlying etiology is unknown[8,9] (Table 1). Regardless, a significant proportion of the known AF risk factors are modifiable.

Statement of Conflict of Interest: see page 123.

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http://dx.doi.org/10.1016/j.pcad.2015.07.001
0033-0620/

Abbreviations and Acronyms

A1c = hemoglobin A1c

AAD = anti-arrhythmic drug

ACEI = angiotensin-converting enzyme inhibitors

AF = atrial fibrillation

AHI = apnea/hypopnea index

ARB = angiotensin receptor blockers

BMI = body mass index

BP = blood pressure

CHD = coronary heart disease

CI = confidence interval

CPAP = continuous positive airway pressure

CRF = cardiorespiratory fitness

CV = cardiovascular

CVD = cardiovascular disease

DBP = diastolic blood pressure

HF = heart failure

HR = hazard ratio

HTN = hypertension

LVEF = left ventricular ejection fraction

MET = metabolic equivalent of task

MI = myocardial infarction

OR = odds ratio

OSA = obstructive sleep apnea

PA = physical activity

RFM = risk factor management

RR = relative risk

SBP = systolic blood pressure

T2DM = type 2 diabetes mellitus

US = United States

VHD = valvular heart disease

The goal of this paper is to provide an overview of established, modifiable risk factors for AF. Based on this, we will also explore potential lifestyle changes that may potentially decrease the risk of AF.

Obesity

Multiple studies have shown an association between obesity and AF.[8] Evidence suggests that large body size during youth and weight gain from age 20 to midlife are both independently associated with the development of AF.[9] Although the association between obesity and AF is multifactorial, one explanation involves left atrial (LA) size and volume,[10] as LA enlargement is a known precursor of AF.[11,12] Furthermore, obesity has been strongly linked to LA size,[13,14] as well as electrostructural remodeling, which has been associated with spontaneous and more persistent AF.[15] Additionally, data suggest that obesity is an independent predictor of left ventricular (LV) diastolic dysfunction, in all age groups from children as early as age 9 years to the elderly,[16–18] which is a known risk factor for the development of AF.[19,20]

A study published in 2010 demonstrated pericardial fat as another risk factor for incident AF.[21] The presence of pericardial fat has been associated with the presence of AF, AF chronicity, and symptom burden of AF.[22] Furthermore, pericardial fat was also found to be predictive of long-term AF recurrence after radiofrequency ablation.[23] Despite this, weight reduction has been associated with a reduction in pericardial adipose tissue.[24]

Table 1 – Modifiable atrial risk factor.

Modifiable Atrial Fibrillation Risk Factors
Obesity
Obstructive Sleep Apnea
Hypertension
Diabetes Mellitus
Alcohol Consumption

A meta-analysis of 16 studies looking at a total of 123,249 individuals demonstrated that obese individuals have a 49% increased risk of developing AF compared to non-obese individuals (relative risk [RR] 1.49, 95% confidence interval [CI] 1.36–1.64).[25] Importantly, a large, prospective, community-based observational cohort study demonstrated a 4% increase in AF risk per 1-unit increase in body mass index (BMI) in men (95% CI, 1%–7%; $P = 0.02$) and in women (95% CI, 1%–7%; $P = 0.009$).[26] Furthermore, obesity has been associated with the risk of AF regardless of the presence or absence of metabolic syndrome.[27]

In addition to the association between AF and BMI, evidence suggests that obesity may also be a risk factor for the progression of paroxysmal AF to permanent AF. Progression of AF has been associated with higher morbidity and mortality. Individuals who progressed from having first-detected or paroxysmal AF to persistent or permanent AF have been found to have higher rates of stroke, transient ischemic attack, myocardial infarction (MI), hospital admission, and death when compared to those individuals whose AF had not progressed.[28] A longitudinal cohort study of 3248 patients demonstrated that after adjusting for age and sex, BMI independently predicted the progression to permanent AF (hazard ratio [HR] 1.04, CI 1.03–1.06; $P < 0.0001$).[29] Compared with normal BMI (18.5–24.9 kg/m^2), obesity (30–34.9 kg/m^2) and severe obesity (≥35 kg/m^2) were associated with increased risk for progression (HR 1.54, 95% CI 1.2–2.0; $P = 0.0004$) and 1.87, 95% CI 1.4–2.5; $P < 0.0001$, respectively).

Similarly, an observational population-based cohort study demonstrated lower rates of progression of first-detected or