

The Effects of E-cigarette Use on Cardiovascular Health: A Systematic Review & Meta-analysis

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Background: The health-related adverse outcomes associated with cigarette consumption has led the public to seek healthier alternatives. In recent years, electronic cigarettes (EC) have become popular substitutes. Heart disease is the leading cause of mortality in the United States and tobacco smokers are 3.5 times more likely to experience fatal cardiovascular outcomes. Thus, it is crucial to investigate the cardiovascular risks associated with electronic cigarette use.

Goals: This systematic review was designed to identify the effects of EC use on the cardiovascular system in adults.

Methods: We gathered 364 articles using relevant keywords on scientific databases. Initial screening removed 282 articles based on title and abstract. The remaining studies were evaluated by full-text. We included 17 studies with low-moderate risk of bias in our study. We analyzed the effects of EC on cardiovascular parameters including systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), heart rate variability (HRV), flow-mediated dilation (FMD), pulse wave velocity (PWV), augmentation index (AI), markers of oxidative stress (OS), endothelial function (EF), and platelet function (PF).

Results: Our analysis included 839 participants (510 males, mean age 22.9 - 46.8 years, and mean BMI 22.9-27.8 kg/m²). When comparing acute nicotine-containing EC (ECN) use with controls, it was observed that SBP, DBP, and HR increased but no changes in OS or FMD. Acute ECN use compared with EC without nicotine (EC0) demonstrated increases in SBP, DBP, HR, PWV, and AI, and no significant differences in FMD. Comparison of acute ECN use with tobacco cigarettes showed decreases in SBP, DBP, HR, OS, EF and PF and no significant differences in FMD and AI.

Conclusion: We present evidence supporting that ECNs adversely affect arterial stiffness, SBP, DBP and HR. In chronic tobacco cigarette smokers, switching to EC may reduce the risk of cardiovascular disease through decreases in hemodynamic parameters, reduced oxidative stress, and improvement in endothelial and platelet function. In non-smokers, e-cigarette initiation may induce adverse cardiovascular effects through increases in sympathetic activity and arterial stiffness. These effects have

the potential of increasing the risk of arrhythmias, sudden death, vascular diseases (particularly atherosclerosis), and heart disease.

Learning Objectives

Describes the effects of electronic cigarettes on cardiovascular measures.

Demonstrate the differences in cardiovascular effects between electronic cigarettes and combustion cigarettes.

Discusses the effects of nicotine and nicotine delivery systems on cardiovascular measures.

References and Resources

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