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Effect of Electronic Cigarette on Aortic Stiffness: A Systematic Review

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ADMINISTRATIVE INFORMATION

Support - TAP-K015227.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 4 April 2025 and was last updated on 4 April 2025.

INTRODUCTION

Review question / Objective The aim of the study is to determine the effects of electronic cigarettes on aortic stiffness. P: Electronic cigarette users. I: Pulse Wave Velocity involvement in electronic cigarette users C: Compared with electronic cigarette non-users. O: Aortic Pulse wave velocity is relatively higher in electronic cigarette users. S: Human study.

Rationale 1) The prevalence of electronic cigarette users is increased. 2) There is a lack of studies on electronic cigarettes causing aortic stiffness in human subjects. 3) There is a lack of studies reported or reviewed on the latest published papers (10 years of publications) related to the topic.

Condition being studied Studies that measure aortic Pulse Wave Velocity (PWV) among electronic cigarette users and involve adult human subjects, both male and female, regardless of ethnicity, were included.

METHODS

Search strategy A comprehensive literature search was conducted across five online databases (Ovid, Scopus, PubMed, Web of Science, and Google Scholar), and only studies that were published from January 2015 until February 2025 were included. The search employed the following keywords: (“electronic cigarette” OR “electronic vaping” OR “vape” OR “vaping”) AND ("pulse wave velocity" OR "pwv" OR "arterial stiffness" OR "aortic stiffness" OR "aortic pulse wave velocity" OR "carotid-femoral pulse wave velocity" OR "cf-pwv" OR "vascular function" OR "vascular compliance").

Participant or population Electronic cigarette users.

Intervention Electronic cigarette.

Comparator PWV level measured in group of electronic cigarette users compared to non-electronic cigarette users.

Study designs to be included Human study (Observational study and case-control).

Eligibility criteria The inclusion criteria: full-text original articles published in English, studies reporting pulse wave velocity level among electronic cigarette users, and studies involving healthy subjects, regardless of gender and ethnicity. While the exclusion criteria are articles not published in English, non-original articles (reviews, editorials, case reports, conference abstracts, newsletters, books, and book chapters), in vitro and in vivo studies, and studies that do not report pulse wave velocity in electronic cigarette users.

Information sources The articles were searched for in online databases through the UKM Library website. Then, using Mendeley, the articles were exported and downloaded.

Main outcome(s) A total of 1 548 articles were identified, and only nine studies were included. Based on the results, aortic pulse wave velocity was found to be increased in electronic cigarette users compared to non-electronic cigarette users in the majority of the studies. There are eight studies that found an increase in aortic pulse wave velocity level in electronic cigarette users. However, one study shows a decline in pulse wave velocity among electronic cigarette users compared to non-electronic cigarette users.

Data management Not applicable.

Quality assessment / Risk of bias analysis Not applicable.

Strategy of data synthesis Similarly, these three authors (C.A.C.M.L., N.S., and A.A.) independently conducted data extraction using a standardized Excel form. The collected data included the first author's name, year of publication, study design, population characteristics (e.g., age and gender), and methods for measuring pulse wave velocity levels in electronic cigarette users. Any disagreements were settled through consensus or, if necessary, with input from authors (A.U. and A.A.H.).

Subgroup analysis Not applicable.

Sensitivity analysis Not applicable.

Language restriction English.

Country(ies) involved Malaysia.

Other relevant information Not applicable.

Keywords Electronic cigarette; electronic vaping; vape; vaping; pulse wave velocity; arterial stiffness; aortic stiffness; aortic pulse wave velocity; vascular function.

Contributions of each author

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