



5.2 Arterial Stiffness and Periodontitis: A Systematic Review and Meta-Analysis

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ABSTRACT

Background: Despite a large number of studies linking cardiovascular diseases and periodontitis (Buhlin et al. 2011; Hansen et al. 2016; Pussinen et al. 2003), few studies make it possible to draw accurate conclusions on the link between periodontitis and arterial stiffness. Endothelial cells maintain vascular homeostasis but are affected by inflammatory injuries (Lacolley et al. 2017). Periodontal diseases involve bacteria-induced inflammation of the tissues supporting the teeth (Tomás et al. 2012), inducing endothelial dysfunction. We conducted a systematic review from existing studies for answering the following questions: (1) Do periodontitis patients have impaired arterial stiffness compared to controls? (2) Is periodontal treatment effective to improve pulse wave velocity (PWV) values?

Methods: A systematic review of the literature, focusing on measurements of PWV in periodontitis patients, was conducted by two independent reviewers. The literature search was done until June 2019. Risk of bias was independently assessed. All clinical studies reporting PWV in patients with severe periodontitis were retrieved for full-text evaluation.

Results: Final selection included 16 studies for qualitative analysis and 10 studies for quantitative analysis (meta-regression analysis). The results show that patients with severe periodontitis have increased PWV compared to controls (PWV mean difference 0.81 m/s; 95% CI: 0.56–1.06; $p < 0.00001$). This concerns both carotid to femoral, brachial ankle and carotid radial PWV. However, we were unable to identify a positive effect of periodontal treatment on PWV value.

Conclusion: This systematic review and meta-analysis support an association between severe periodontitis and PWV.

REFERENCES

- [1] Buhlin K, Mäntylä P, Paju S, Peltola JS, Nieminen MS, Sinisalo J, et al. Periodontitis is associated with angiographically verified coronary artery disease. *J Clin Periodontol* 2011;38:1007–14.
- [2] Hansen GM, Egeberg A, Holmstrup P, Hansen PR. Relation of periodontitis to risk of cardiovascular and all-cause mortality (from a Danish nationwide cohort study). *Am J Cardiol* 2016;118:489–93.
- [3] Lacolley P, Regnault V, Segers P, Laurent S. Vascular smooth muscle cells and arterial stiffening: relevance in development, aging, and disease. *Physiol Rev* 2017;97:1555–617.
- [4] Pussinen PJ, Jousilahti P, Alftan G, Palosuo T, Asikainen S, Salomaa V. Antibodies to periodontal pathogens are associated with coronary heart disease. *Arterioscler Thromb Vasc Biol* 2003;23:1250–4.
- [5] Tomás I, Diz P, Tobias A, Scully C, Donos N. Periodontal health status and bacteraemia from daily oral activities: systematic review/meta-analysis. *J Clin Periodontol* 2012;39:213–28.

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