Efficacy of periodontal treatment on glycaemic control in diabetic patients: a meta-analysis of interventional studies
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CRD summary
The authors concluded that periodontal treatment could improve glycaemic control, but that this result should be viewed with caution because of a lack of robustness and deficiencies in the design of some of the included studies. The authors' conclusion reflected the evidence presented and is likely to be reliable.

Authors' objectives
To evaluate the effect of periodontal therapy on glycaemic control in patients with diabetes and periodontitis.

Searching
MEDLINE, PASCAL, EMBASE, LILACS, The Cochrane Library, International Association of Dental Research (IADR) and Abstracts and Current Contents databases were searched from January 1976 to 31 December 2007. Search terms were reported. Bibliographies of relevant retrieved articles were handsearched and authors were contacted to identify unpublished studies. The search was conducted with no language or publication restrictions.

Study selection
In the controlled trials, interventions included: oral hygiene instructions; scaling and root planing; oral hygiene instructions, scaling and root planing; scaling, root planing and antibiotics; and scaling, root planing, antiseptic mouthwash and/or irrigant and antibiotic. Eligible studies were original interventional studies in patients with both diabetes and periodontitis that provided a numerical value for haemoglobin A1c (HbA1c). For inclusion in the meta-analysis, studies had to have a control group (defined as a group of patients with diabetes who had periodontitis but did not receive any periodontal treatment). Review articles and meta-analyses were excluded from the review.

Sixteen non-controlled trials and nine controlled trials (eight published and one unpublished) were included in the review. Most trials took place in a hospital setting. Most participants had type 2 diabetes. Most participants were male. Most were white. All patients had periodontitis. Mean age was 58.1 years. Mean diabetes duration was 11.6 years. Interventions included: scaling and root planing with or without oral hygiene instructions, antibiotics or antiseptic (mouthwash and or/irrigant). Study duration lasted from six to 43.5 weeks. Methods for evaluating periodontitis varied. Methods for determining HbA1c were high-performance liquid chromatography, immunoassay or were not reported.

Two reviewers independently selected the studies for inclusion in the review. Any differences were resolved by discussion.

Assessment of study quality
Only published controlled trials were assessed for study quality. Study quality was assessed using the CONSORT checklist and the Delphi List. Criteria in the Delphi List included: randomisation; allocation concealment; baseline similarity; eligibility criteria; blinding; point estimates and measures of variability for primary outcomes; and intention-to-treat analysis.

Two reviewers independently performed the study quality assessment. Disagreements were resolved by consensus.

Data extraction
Data were extracted in order to calculate standard mean differences (SMD) and 95% confidence intervals (CI). Authors were contacted where data was missing or inadequate. Two reviewers independently performed the data extraction. It was not reported how disagreements were resolved.

Methods of synthesis
Standard mean differences were combined in a meta-analysis using fixed-effect and random-effects (DerSimonian and Laird) models, taking into account the inverse of the variance. Sensitivity analysis was performed by removing one study at a time from the analysis. Heterogeneity was assessed using the Cochrane Q test. Publication bias was assessed using the Begg's test and Egger's test.

Results of the review
Sixteen non-controlled trials and nine controlled trials (eight published, one unpublished) were included in the review. Eight controlled studies (nine comparisons) were included in the meta-analysis (n=485 patients). Sample sizes ranged from 22 to 165 patients. Of the eight published controlled studies, only one was of the highest quality. Seven trials were adequately randomised and three were single blinded. Publication bias was reported to be absent.

Treatment of periodontal disease was associated with an improvement in glycaemic control (SMD 0.46, 95% CI 0.11 to 0.82, p=0.01). This equated to a 0.79% (95% CI 0.19 to 1.40) reduction in HbA1c. There was no evidence of statistically significant heterogeneity. However, a sensitivity analysis showed that one study significantly deviated from the calculated overall effect. The removal of this study resulted in the overall standard mean difference becoming non statistically significant (SMD 0.27, 95% CI -0.01 to 0.60).

Authors' conclusions
Periodontal treatment could improve glycaemic control. However, this result should be viewed with caution because of lack of robustness and deficiencies in the design of some of the studies included.

CRD commentary
This review addressed a clear research question and was supported by adequate inclusion criteria. The search strategy was comprehensive, with no language or publication restrictions. There was no evidence of publication bias. The study quality assessment tools used were appropriate to the study design to which they were applied and revealed that most included studies were of poor methodological quality. Synthesis methods were appropriate. The authors acknowledged several limitations with their analysis, such as small sample size and clinical heterogeneity of included studies. The review process was carried out with sufficient attempts to minimise reviewer error and bias. The authors' conclusion reflected the evidence presented and is likely to be reliable.

Implications of the review for practice and research
Practice: The authors stated that although the present meta-analysis provided the best available information, it did not provide sufficient information on which to confidently base any clinical recommendations.

Research: The authors stated that there was a need for a prospective interventional trial. Future research should: randomise diabetic patients with periodontitis into two groups and plan a blinding protocol; define the target population a priori, including sample size; consider a minimum of two months between baseline and final assessments of HbA1c; take into account the type of hypoglycaemic medication and control its modification during the follow up; and check the improvement in periodontal status at the end of the study and correlate it with improvement in glycaemic control.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.