

Mechanical debridement with antibiotics in the treatment of chronic periodontitis: effect on systemic biomarkers: a systematic review

Student Name: Sudhir L Munasur

Supervisor: Prof Chikte, Ms Turawa

Background: Chronic periodontitis is an inflammatory oral disease which leads to the destruction of the supporting tissues of the teeth, leading to bone resorption and tooth loss. Destruction of the periodontal attachment apparatus can result in gingival recession and root furcation exposure in advanced stages resulting in tooth mobility and tooth loss. Mechanical debridement is the most frequent treatment for chronic periodontitis, in severe cases systemic antibiotics in conjunction with mechanical debridement have been used. The efficacy and the beneficial effect of this combination on the inflammatory biomarkers require further investigation.

Objectives: The aim of this systematic review was to assess the effectiveness of adjunctive antibiotics in the improvement of inflammatory systemic biomarkers in the treatment chronic periodontitis. Search methods: We searched the following electronic databases: Cochrane Oral Health Group Trials Register (30th June 2018). The Cochrane Central Register of Controlled Trials (CENTRAL) (Cochrane Library 2018 – current issue), MEDLINE (1966 to present), EMBASE (1982 to present), CINAHL via EBSCO (1990 -present), Google scholar (1990 - present). Web of Knowledge (1990 to May 2018), The meta-Register of Controlled Trials (www.controlled-trials.com), The US National Institutes of Health On-going Trials Register (www.clinicaltrials.gov). The World Health Organization International Clinical Trials Registry platform (www.who.int/trialsearch) was searched to identify relevant trials for inclusion in the review. Conference proceedings, on-going trials registers (02/06/2018) and reference list of included articles were assessed for relevant trials. No language or date of publication restrictions applied.

Selection criteria: We searched for randomised controlled trials (RCTs that evaluated the effectiveness of adjunct antibiotic therapy on the systemic biomarkers in the treatment of chronic periodontitis. All trials that compared adjunctive systemic antibiotics with mechanical debridement or mechanical debridement alone, or scaling and root planning, oral hygiene and prophylaxis or placebo were included in the study. Data collection and analysis: Two reviewers independently examined the titles and abstracts retrieved by the search to identify relevant trials for inclusion in the review. All included trials were assessed for risk of bias and data were extracted for further analysis. The primary outcomes assessed include: changes in serum/blood levels of inflammatory

biomarkers such as Matrix Metalloproteinases (MMPs), Tissue Inhibitors of MMPs (TIMs), Cytokines, C-Reactive Protein(CRP) and Glycated haemoglobin(HbA1c). Secondary outcomes include periodontal indices such as bleeding on probing (BOP), gingival index (GI), clinical attachment level (CAL), plaque index (PI) and probing pocket depth (PPD).

Main results: Fourteen trials (n=1457 participants) were included in the review. Seven trials reported on MMP-8, with average of 3 months' time to event. Five trials reported on IL-1 β , three trials on IL-6 and two on IL-8 serum level. Four trials reported on CRP, while eight reported on HbA1c level and one on TIMP-1 level. Trials were assessed for risk of bias and judged as low, high, or unclear of risk of bias. Six studies showed no significant differences in MMP-8 concentration level between the two intervention groups. Significant decrease (60%) in odds of increased MMP-8 levels during 2-year study was reported in one trial (OR 0.40, 95%CI: 0.21 to 0.77, p=0.006). One study reported no significant difference for TIMP-1 (0.96, 95% CI: 0.78 to 1.18, p=0.7), while two studies showed significant reduction in HbA1c (10%) at 3 months. Other studies reported no difference in HbA1c levels (%): (Mean (SD) 7.00 (0.76) versus 7.11 (0.99); p=0.710), (Median (Interquartile Range [IQR]) 6.3 (5.5,7.3) versus 6.7 (6.3, 7.7); p=0.8), (p=0.35, 0.55, 0.33, and 0.62, at baseline, 3 months, 6 months, and after 1 year of treatment, respectively. Metaanalysis showed a mean reduction of 0.24mm in the periodontal pockets (PD) at 3 months [MD, -0.25 with 95% CI -0.38 to -0.12]. Two trials revealed no significant difference PD \leq 3mm at 3 months, [MD, -1, 95% CI -22.54 to 20.53 (p=0.19)]. A decrease in periodontal pockets (PD \geq 4mm) and a reduction of 3.38mm in favour of SRP+antibiotics after 3 months [MD, -3.38, 95% CI -6.51 to -0.25 (p=0.93, I 2 =0%)] was observed for probing depth (PD). No significant difference in clinical attachment level (CAL) at 3 months [MD, -0.13, 95% CI -0.34 to 0.07; Chi 2 =0.98, df=3, p=0.81, I 2 =0%]. The overall quality of evidence was low largely because of attrition bias (24%; 32%) connoting high risk of bias and wide confidence intervals which suggests imprecision of results.

Authors' conclusions: There is limited but low-level of evidence suggesting that systemic antibiotic therapy combined with mechanical debridement improves the systemic biomarker levels during the treatment of chronic periodontitis