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study

An anti-inflammatory diet can reduce gingivitis

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Background

Gingivitis, a highly prevalent inflammatory condition, is a prerequisite for the development of the more destructive disease of periodontitis.

Uncontrolled plaque accumulation can result in gingivitis, which might be aggravated by the so-called "Western diet" – high in processed carbohydrates and fatty acids (saturated, trans, and omega-6), and low in micronutrients and fibre.

This type of diet can promote systemic inflammation through vascular inflammation and endothelial dysfunction. As a result, leakage of plasma components in the subgingival region can benefit the outgrowth of specific pathobionts and further disturb immune fitness. A diet high in carbohydrates can also increase plaque accumulation. These phenomena can alter the oral ecosystem and make the periodontium vulnerable to gingivitis.

To break this vicious circle of inflammation and plaque accumulation, it has been suggested that a healthy ("anti-inflammatory") diet might reduce gingival inflammation and ultimately improve oral health.

Aims

The main objective was to assess the effect on gingival inflammation of a healthy diet compared to a "Western" diet, over an eight-week period. The effects on the subgingival microbiome and blood-chemistry parameters were also evaluated.

Materials & methods

This was a single-blinded randomised controlled clinical trial with 30 subjects, randomly allocated to the experimental (n=15, mean age 27.2 yr) or the control group (n=15, mean age 33.7 yr). All participants were instructed to refrain from interdental cleaning during the trial.

Inclusion criteria were a mean gingival index (GI) of at least 0.5 and consumption of a "Western" diet including processed carbohydrate intake >45%. Exclusion criteria were smoking, periodontitis, life-threatening illnesses, antibiotics (within six months of the start of the trial or during the study period), drugs influencing gingival inflammation or bleeding, carbohydrate- or insulin-related diseases, and pregnancy or breastfeeding.

From baseline to two weeks both groups consumed a "Western" diet. From weeks two to eight, the experimental group changed to an anti-inflammatory diet (AID) and the control group continued with the "Western" diet.

The AID diet consisted of macronutrients (elimination of processed carbohydrates, omega-3 fatty acids, fewer industrial animal proteins) and micronutrients (vitamins C and D, antioxidants, fibre, nitrate-containing plants).

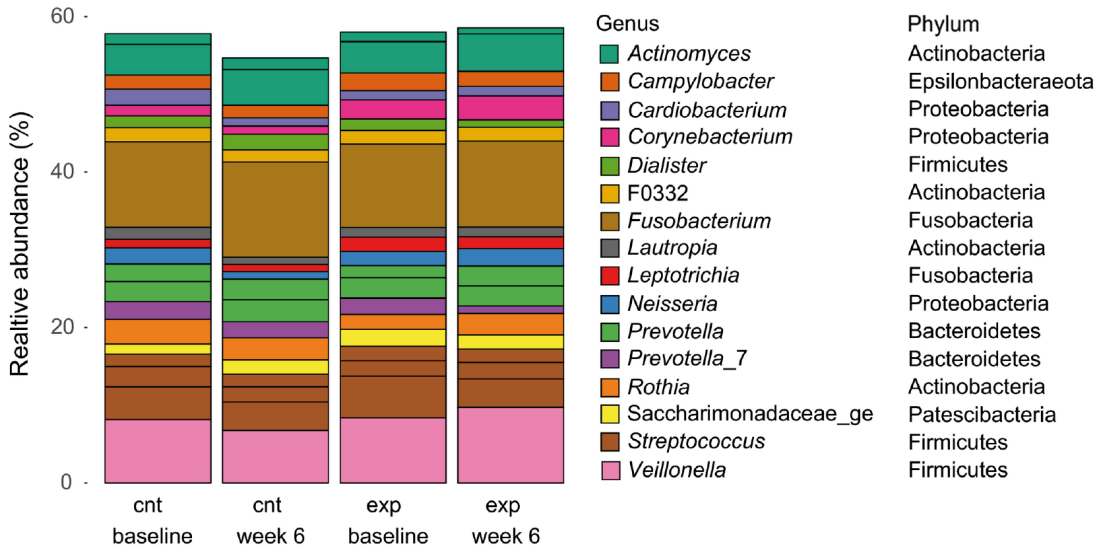
GI was the primary outcome, while secondary outcomes were plaque index (PI), periodontal probing depth (PPD), bleeding on probing (BoP), periodontal inflamed surface area (PISA), body-mass index (BMI), weight, subgingival microbiome, and plasma biochemical parameters.

Clinical measurements were performed at baseline, one, two, five, six, seven, and eight weeks. Food questionnaires were filled out at one, six, and eight weeks and a dietary diary at two, five, and eight weeks. Subgingival plaque samples and blood chemistry were performed at two and eight weeks.

Figure

The subgingival microbiome in this limited sample of subjects failed to show any significant differences in the relative abundance of the 20 most frequent operational taxonomic units (OTU).

(cnt: control group, exp: experimental group)



Results

Primary outcome (GI)

- The experimental group showed a significantly higher reduction in GI than the control group: 1.03 - 0.61 vs 0.92 - 0.74.

Secondary outcomes

- The participants in the experimental group showed a significant mean weight loss of 1.5kg. In contrast, the control group showed a mean weight gain of 0.5kg.
- In the experimental group, a significant increase in plasma vitamin-D levels was found: 27.5µg at baseline vs 36.56µg after eight weeks. There was no significant increase in the control group. The difference between the experimental group and control group was statistically significant. No differences were found regarding the other plasma biochemical parameters.
- Both groups showed a reduction in BoP.
- No differences were found between the groups regarding the subgingival microbiome.
- The diet in the experimental group resulted in higher energy consumption, fewer carbohydrates, more fibre, less fat, fewer saturated fatty acids, and lower salt intake than in the control group.

Limitations

- The follow-up time of eight weeks was relatively short and the number of participants was small.
- There was no standardisation of diet intake, beverage intake (such as alcoholic drinks), and oral care at home.
- Physical activity might be a confounding factor.
- Baseline GI scores were not severe (mean GI=1) for either group. Minor changes at the end of the study may therefore not be clinically relevant.

Conclusions & impact

- Within the limitations of this study, it can be concluded that the proposed healthy (anti-inflammatory) diet can have a positive effect on reducing levels of gingival inflammation, at least in the short term.
- Gingival inflammation can be reduced by changing to a plant-based, whole-food diet.
- A healthy diet might be able to enhance the host immune fitness and may also reduce inflammatory reactions to dental biofilms. Dietary advice could therefore be included in gingivitis treatment.

JCP Digest issue number 64 is a summary of the article 'The influence of an anti-inflammatory diet on gingivitis. A randomized controlled trial', *J Clin Periodontol*. 2019; 46 (4): 481-490, DOI: 10.1111/jcpe.13094.

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