RE: Tea Tree Oil Gel Improves Efficacy of Dental Plaque Removal for Moderate Periodontitis


Periodontitis is a common microbial infection-induced inflammatory gum disease that destroys the periodontium which leads to tooth loss. The severity of the disease depends on the patient's immune-inflammatory response to microbial dental plaque. Removing dental plaque via scaling and root planing (SRP) as a first line treatment can stop inflammation and disease progression. In more severe cases, systemic antibiotics are prescribed; however, antibiotics have a variable degree of success. Tea tree (*Melaleuca alternifolia*, Myrtaceae) oil (TTO) has documented anti-inflammatory, antioxidant, antifungal, antiviral, and antimicrobial effects. Prior studies have shown that locally delivered TTO can manage periodontitis. The authors propose a six-month, parallel, randomized controlled clinical trial to assess the effects of a topical TTO gel adjunctive to SRP on managing moderate (stage 2) periodontitis. Efficacy was determined by analyzing the correlation of gingival crevicular fluid (GCF) levels of matrix metalloproteinase-8 (MMP-8) with clinical response.

This study was conducted from November 2019 to August 2020 at the Department of Oral Medicine, Periodontology, Diagnosis and Oral Radiology, Faculty of Dentistry, Alexandria University, Egypt. Men and women, aged 25-50, who were diagnosed with stage 2, grade B periodontitis were included. Diagnosis was confirmed by a clinical attachment level (CAL) of 3-4 mm, bleeding on probing (BOP), and an O'Leary plaque index ≤ 10%. Exclusion criteria were smokers, pregnant, receiving contraindicated medications, chemotherapy, or radiotherapy within the last year, or living with a systemic disease that may affect treatment outcomes.

The TTO gel (Sigma Aldrich®; Steinheim, Germany) was prepared by the Department of Pharmaceutics, Faculty of Pharmacy, Alexandria University, and contained Carbopol 940 (1% weight per volume [w/v]), water, TTO, propylene glycol, and methyl paraben 0.2% w/v. Sodium hydroxide was added until the desired pH of 6.5-7 was achieved.

Patients were randomized and equally divided into the following two groups: control group (SRP alone) and treatment group (SRP with TTO). The SRP was performed at
baseline using hand instruments, ultrasonic scalers, and oral hygiene instructions. The treatment group then had the test site isolated and dried with air. TTO gel was injected into the pocket using a dull syringe. Excess gel was removed with a sterile gauze. The treatment group patients were instructed not to use a toothbrush on the test site, and not to chew hard or sticky foods for 24 h after TTO application. All patients were instructed to follow strict oral hygiene during the study.

Pocket probing depth (PPD), CAL, gingival index (GI), and BOP were recorded at three and six months after baseline. A sample of GCF was taken and MMP-8 was analyzed at baseline and at one month, three months, and six months after treatment.

Of the 40 patients screened, 30 were included (10 males and 20 females). Each group contained 15 patients, the average age for the control group was 28.9 ± 6.3, and the treatment group was 30.5 ± 5.6. No adverse reactions were reported.

Both control and treatment groups saw statistically significant improvements from baseline in PPD, CAL, GI, and BOP at all follow up periods. No significant differences occurred between groups at any period for PPD and % reduction in PPD. There was a significant improvement for the treatment group compared to control for CAL (P = 0.004), % reduction in CAL (P = 0.003), BOP (P = 0.002), and % reduction in BOP (P = 0.001) after six months. No significant difference for these factors occurred at baseline or three months. No difference for GI occurred between groups at baseline; however, there was a significant improvement in the treatment group compared to control at the three month (P = 0.005) and six month (P = 0.005) check-in. The mean % reduction in GI also saw statistical improvement for the treatment group compared to the control group at three months (P = 0.029) and six months (P = 0.001).

There was a reduction in GCF MMP-8 for both the treatment and control groups; no significant between group differences occurred at one and three months. GCF MMP-8 significantly improved for the treatment group compared to control at six months (P = 0.005). There was also a significant % reduction for the treatment group compared to control at three (P = 0.003) and six months (P < 0.001). There was a significant positive correlation in the treatment group between the decrease of GCF MMP-8 levels and clinical findings but not in the control group. In the treatment group, there was a positive correlation of PPD and GCF MMP-8 at three months (P = 0.047) and six months (P = 0.005); for CAL and GCF MMP-8 at three months (P = 0.040) and six months (P = 0.004); and for both GI and BOP and GCF MMP-8 equally at three months (P < 0.001) and six months (P = 0.021).

The authors conclude that there are clinical benefits for TTO gel as an adjunctive to SRP for treating moderate periodontitis. TTO showed positive benefits for all the markers for periodontitis and positive correlation between GCF MMP-8 and GI, CAL, PPD, and BOP. Limitations in this study included length of the follow-up period and the number of patients. The authors suggest a larger and longer study to verify these findings.

—Dani Hoots