

Clinical Efficacy of Mucoadhesive Lycopene Solid Lipid Nanoparticle Gel and Its Antioxidant Effect Using Protein Carbonyl as an Oxidative Stress Biomarker in Periodontitis Patients

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Abstract:

Aim: To evaluate the clinical and antioxidant efficacy of Lycopene solid lipid nanoparticle gel as an adjunct to non-surgical periodontal therapy in chronic periodontitis.

Methods: A 3-month multi-arm, randomised, parallel group trial was conducted in 90 periodontitis patients allocated to 3 groups. Group I receiving scaling and root planing (SRP) only and group II receiving lycopene solid lipid nanoparticle (LP-SLN) gel as an adjunct to scaling and root planing, while healthy patients are in group III. Clinical parameters were evaluated at baseline, 1 and 3 months, while protein carbonyl level in GCF as an oxidative stress biomarker was evaluated at baseline and 1 month.

Results: At 3 months, both groups showed statistically significant reduction in mean probing depth and clinical attachment level, 1.75 mm and 1.68 mm (Group I) and 2.58 mm and 2.68 mm (group II) respectively, with significant differences between them. Protein carbonyl levels in GCF were observed to be higher in the periodontitis group (4.85 ng/mL) compared to healthy patients (0.98 ng/mL). Both group I and II exhibited a reduction in protein carbonyl levels 1 month after intervention, but significant reduction seen in the SRP+LP-SLN group. Intergroup differences were insignificant ($p > 0.05$).

Conclusion: LP-SLN gel with non-surgical periodontal therapy showed a significant reduction in levels of protein carbonyl than SRP alone and improvement in clinical parameters, suggesting a potential antioxidant effect in the treatment of periodontitis.

Keywords:

Periodontitis, lycopene, solid lipid nanoparticles, protein carbonyl, scaling and root planing.