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College of Dentistry

The Effect of Lycopene Anitoxidant Gel Compared to Minocycline HCL Microspheres Gel as Adjunctive in the Non Surgical Peridontal Treatment by Measuring Immunological and Clinical Parameters.

(Randomized Clinical Trial)

A thesis

Submitted to the council of College of Dentistry/University of Baghdad, in partial fulfillment of requirements for the Degree of Master of Science in Periodontics

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Abstract

Background

Periodontal diseases are among the most common medical conditions that may influence humans. Conventional Scaling and root Planning can be combined with locally applied minocycline HCL microspheres (Arestin) to improve outcomes. Antioxidant Lycopene extract can be applied as a gel intra-pocket and it have a promising result with the scaling and root planning.

Aim of the study

The assessment of the effect of Minocycline HCL microspheres (Arestin) and Lycopene gel as adjunctive therapeutic agents when they are applied intra-pocket with conventional scaling and root planning therapy.

Material and Methods

After the approval of the ethical committee; A total of 15 Iraqi patients aged 35-65 years, twelve males & three females who met the eligibility criteria were precipitated in this study for the non-surgical treatment of sever chronic periodontitis. The study conducted in the department of periodontology, teaching hospital of Collage of Dentistry –University of Baghdad, the study utilized split mouth technique; 3 sites within the oral cavity that have pocket depth ≥ to 5 mm included. Each site was designated to receive a specific treatment which were randomly selected, control group treated with Scaling Root Planning therapy alone, Arestin group had local application of Arestin with SRP therapy, and the lycopene group received lycopene gel and Scaling Root Planning treatment. The influence of these therapeutic protocols was determined by evaluating the expression of inflammation related markers (Tissue Inhibitor of Metalloproteinases -1, Matrix Metalloproteinases -9 and Interleukin-8) within the gingival crevicular fluid that were collected from the experimental sites and the changes that occurred in the clinical parameters. The baseline was determined in the first visit; gingival crevicular fluid samples were

collected from each site before the commencement of Scaling Root Planning treatment to avoid contamination with blood, the baseline clinical parameters were recorded. Then Conventional Scaling Root Planning therapy commenced in all allocated treatment sites, followed application of lycopene gel and Arestin into the designated pockets. The gingival crevicular fluid samples collection procedure achieved by using paper strips (Oroflow, USA), which were gently introduced into the pocket until minimum resistance was felt and left in situ for 30 seconds, then carefully transferred into Eppendorf tube and incubated with 200 µl phosphate buffer saline and stored in -80 c° until the evaluation. The patients had a second visit after one week for collection second gingival crevicular fluid samples and re-evaluation the clinical outcomes (gingival index, relative attachment level, plaque index, pocket depth, and bleeding on probing) of each site. The third visit was after one month where all patients subjected to re-assessment of the clinical parameters. The stored markers were gradually defrosted and the concentrations were assessed using enzyme linked immunosorbent essay quantitative sandwich immunoassay technique (R&D Systems) by following the manufacturer protocol.

Results

The results revealed that Arestin has the most potent effect on clinical parameters, followed by lycopene and Scaling Root Planning alone has the least effect. The three groups showed a significant improvement ($p < 0.05$) in clinical attachment level gain and reduction; However, the result showed that the conventional therapy had a rapid effect on clinical attachment level gain when compared to the other groups and it has a statistical significance in the second visit. The Pocket Depth reduction was more prominent in Arestin group; although, the control group showed a significant reduction in the 2nd visit whereas Lycopene effect was not apparent not until the 3rd visit. Bleeding on Probing reduced by Lycopene when compared to control group but the result where statistically non-significant; while Arestin unlike the two other groups it

showed a significant reduction in Bleeding on Probing in the 3rd visit. The reduction in Plaque Index was significant ($p < 0.05$) in the second visit in sites treated with Arestin.

The Arestin significantly increased Tissue Inhibitor of Metalloproteinases -1, and Interleukin-8 expression and it showed reduction in Matrix Metalloproteinases -9 concentrations. Although lycopene didn't have a statistical significance of the marker expression, but has a dramatic influence on Tissue Inhibitor of Metalloproteinases -1 and Matrix Metalloproteinases -9. The study demonstrated a Significant weak correlation between Matrix Metalloproteinases -9 and Tissue Inhibitor of Metalloproteinases -1.

Conclusion: The Analysis revealed that Arestin has the most prominent effect on clinical parameters when compared to lycopene and Scaling Root Planning sites; although, they showed a significant influence on reducing the pocket depth and clinical attachment level; the Arestin significantly improved all the clinical outcome (plaque index, pocket depth, bleeding on probing and clinical attachment level).

Markers Incorporated in this research showed that the adjunctive therapy can have effect on improving the convention periodontal treatment, the concentration of these markers in general responded positively in accordance with the clinical enhancement.

The experimental scope of this research provides a new insight into the relationship between the adjunctive locally delivered therapeutic agents and its impact on the periodontal disease.

Trial Registration

This study was registered in clinicaltrials.gov with trial identifier: NCT03964935.