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EFFECT OF QUERCETIN ON BACTERIAL TOXINS USING LIQUID CHROMATOGRAPHY MASS SPECTROMETRY- AN IN-VITRO STUDY

By

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ABSTRACT

Title: Effect of quercetin on bacterial toxins using liquid chromatography mass spectrometry-an in vitro study

Background: Pulpal necrosis is a routine diagnosis in the day-to-day practice of endodontics. *Enterococcus faecalis* is a common inhabitant of the oral cavity. It is strongly associated with the failed endodontic treatment since it possesses certain virulence factors. Thus, endodontic treatment should not only aim at eliminating the micro-organisms but also inactivation of their toxic by-products. In the past few years aiming at sustainability researchers have shown a great interest in investigating natural and herbal extracts to determine their efficacy in the field of medicine. Flavonoids are natural pigments with variable phenolic structures. Quercetin a member of this class of compounds shows the key effect of flavonoids: that is their ability to scavenge oxygen-free radicals. However, there is an inadequacy of literature on the antimicrobial actions of quercetin on bacterial toxins present in failed endodontic treatments. Hence, this study was conducted to comparatively evaluate antimicrobial actions of quercetin against bacterial toxins.

Methods: Forty freshly extracted single-rooted human teeth were used in the study. The teeth were sectioned at cemento-enamel junction transversely using a water-cooled diamond disc and working length was determined. Biomechanical preparation was done up-to #30 K-file, with saline as the irrigating solution for each file used. The outer surfaces of the specimen was covered with 2 layers of epoxy adhesive except the cervical opening. *Enterococcus faecalis* strain ATCC 29212 was inoculated and the lipids were extracted. *Prepared E. faecalis* toxins were inoculated into the root canals of 40 specimens using a micropipette. Later specimens were incubated. After 24 hours, the specimens were prepared biomechanically upto 45# and divided into the following 4 groups , according to the irrigating solution used. Group 1: 2.5% sodium hypochlorite solution, Group 2: 1% (w/v) solution of quercetin, Group 3: 2% (w/v) solution of quercetin and Group 4: 0.2% chlorhexidine solution. Minimal Inhibitory Concentration (MIC) and zone of inhibition tests were conducted for the sample collected from the canals during

biomechanical preparation. Then liquid chromatography mass spectrometry (LC-MS) analysis was performed, and the data obtained from all the groups were subjected to statistical analysis.

Results: There was statistically significant difference ($p<0.005$) noted between the groups for both MIC and zone of inhibition tests. Indicating that 2% quercetin showed good antimicrobial properties. The graphs obtained from LC-MS also showed and confirmed the interaction and breakdown of the surface layer proteins of *E. faecalis* with 1% and 2% w/v Quercetin.

Conclusion: The MIC and zone of inhibition test revealed that quercetin possesses antibacterial properties against the surface layer proteins of *E. faecalis* with a concentration dependent potency.

Keywords: *E. faecalis* ,Quercetin, LC-MS, MIC, Zone of Inhibition.

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