Evaluation of Antimicrobial Activity of Propolis on Regenerative Potential of Non-vital Immature Root Apex in Dogs

A THESIS

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تقييم نشاط البروبوليس المضاد للبكتريا على قمة الجذر غير الحي لأسنان الكلاب

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كجزء من متطلبات الحصول على درجة الدكتوراه
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Dedication

TO MY DEAREST FATHER ...

TO MY LOVELY MOTHER...

TO MY DEAR WIFE...

TO MY LITTLE DAUGHTER...

(وَأَوْحَى رَبُّكَ إِلَى النَّحْلِ أَنِ اتَّخِذِي مِنَ الْجِبَالِ بُيُوتًا وَمِنَ الشَّجَرِ وَمِمَّا يَعْرِشُونَ ثُمَّ كُلِي مِنْ كُلِّ الثَّمَرَاتِ فَاسْلُكِي سُبُلَ رَبِّكِ ذُلُلاً يَخْرُجُ مِنْ بُطُونِهَا شَرَابٌ مُخْتَلِفٌ أَلْوَانُهُ فِيهِ شِفَاءٌ لِلنَّاسِ إِنَّ فِي ذَلِكَ لَآيَةً لِقَوْمٍ يَتَفَكَّرُونَ)

سورة النحل (٦٨-٦٩)

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INTRODUCTION

Necrotic immature teeth inherently suffer from cessation of root development and this will result in teeth with open apex, thin root walls and poor crown root ratio that are difficult to instrument and impossible to seal.

Various treatment options exist to manage a necrotic immature tooth which includes non-surgical root canal treatment (apexification), single visit apexification, apical surgery and extraction. Traditionally customized gutta-percha cone was used to obturate immature canal space, but there is a danger of root fracture during lateral condensation. Long-term calcium hydroxide therapy was considered as the ideal treatment for such teeth, but this therapy has its own disadvantages, like multiple visits, relatively long period of time and alteration of mechanical properties of dentin. Recently, single visit apexification using mineral trioxide aggregate (MTA) has gained popularity. Although this technique is faster compared to traditional apexification, but leaves the tooth with poor crown root ratio and prone to fracture.

Revascularization is a new biologically based non-instrumentation technique which is considered as the ideal treatment for necrotic immature teeth. Revascularization stimulates regeneration of a functional pulp dentin complex that allows continued root development, thickening of dentinal walls and apical closure.

Obtaining and maintaining sterile root canal is one of the most important steps during revascularization. Combination of antibiotic drugs, i.e., ciprofloxacin, metronidazole and minocycline (TAP) has been used to maintain sterile root canal due to its broad spectrum antibacterial property, however this protocol has potential clinical and biological complications, amongst them crown discoloration, development of resistant bacterial strains and allergic reaction.

Propolis is a natural substance, containing about 55% resinous compounds and balsam, 30% beeswax, 10% ethereal and aromatic oils, and 5% bee pollen.

Studies on propolis medical and dental applications have increased because of its therapeutic and biological properties. Current research on the potential applications of propolis in dentistry covers many fields and highlights its antimicrobial and anti-inflammatory activities. Ethanol extract of propolis presents good properties for endodontic use, such as promoting bone regeneration and inducing hard tissue bridge formation in pulpotomies or pulp capping.

It is worth to evaluate a natural substance as a medicament and in promoting regeneration for treatment of necrotic immature teeth.

REVIEW OF LITERATURE

I. Antimicrobial Activity

A. Propolis

Grange and Davey[1] tested the antimicrobial and other properties of propolis and of its therapeutic applications. Twenty-one bacterial strains were received from the Bacteriology Department of the Brompton Hospital and from the Public Health Laboratory, Dulwich. Screening was performed by making a 1: 20 dilution of the ethanolic extract of propolis in blood-agar base (Difco): 1 ml of propolis was added to 19 ml of molten medium at 450C, mixed and poured into a petri dish. After cooling and drying, the plates were inoculated with bacterial suspensions with a Denley applicator. The minimal bactericidal concentrations (MBC) of propolis were estimated by making doubling dilutions from 1: 20 in nutrient broth and inoculating each tube with one drop of a bacterial suspension. The results showed that the preparation of propolis completely inhibited the growth of Staphylococcus aureus, Staph. epidermidis, Enterococcus spp., Corynebacterium spp., Branhamella catarrhalis and Bacillus cereus. It partially inhibited growth of Pseudomonas aeruginosa and Escherichia coli but had no effect on Klebsiellapneumoniae. Thus it appeared to have a preferential inhibitory effect on cocci and Gram-positive rods.