



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

رسالة

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Dedication

TO MY DEAREST FATHER ...

TO MY LOVELY MOTHER...

TO MY DEAR WIFE...

TO MY LITTLE DAUGHTER...

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(وَأَوْحَىٰ رَبُّكَ إِلَى النَّحْلِ أَنْ اتَّخِذِي
مِنَ الْجِبَالِ بُيُوتًا وَمِنَ الشَّجَرِ وَمِمَّا
يَعْرِشُونَ ثُمَّ كُلِي مِن كُلِّ الثَّمَرَاتِ
فَاسْأَلِي سُبُلَ رَبِّكِ ذُلًا يَخْرُجُ مِنْ
بُطُونِهَا شَرَابٌ مُّخْتَلَفٌ أَلْوَانُهُ فِيهِ
شِفَاءٌ لِلنَّاسِ إِنَّ فِي ذَلِكَ لَآيَةً لِّقَوْمٍ
يَتَفَكَّرُونَ)

صَدَقَ اللَّهُ الْعَظِيمُ

سورة النحل (٦٨-٦٩)

CONTENTS

Introduction	1
Review of Literature	3
• Antimicrobial Activity	3
A. Propolis	3
B. Triple Antibiotic Paste.....	14
• Regeneration of Pulp	21
○ Mineral Trioxide Aggregate	24
Aim of the study	42
Materials and Methods.....	43
• Antimicrobial Effectiveness	
• Regeneration.....	
Results	60
• Radiographic Evaluation.....	66
• Histopathologic Evaluation.....	84
Discussion	104
Summary and Conclusion.....	117
References	122
Arabic Summary	-

LIST OF FIGURES

Fig. No.	Figure	Page
1	Showing administration of general anesthesia	56
2	A: showing blood clot inside the canal B: Orifice plug	56
3	Showing digital measurement of root length in pre (1) and follow-up (2) radiographs using image J software ...	56
4	Showing digital measurement of root thickness at the apical third in pre and follow-up radiographs using image J software	57
5	Showing digital measurement of the apical diameter in pre and follow-up radiographs using image J software...	57
6	Bar chart representing comparison between mean log10 CFU with the two materials and control groups....	61
7	Bar chart representing the changes in means log10 CFU of bacterial counts.	63
8	Bar chart representing comparison between mean percentage changes in bacterial count.	65
9	Bar chart representing comparison between percentage increases in root length of different groups...	68
10	Bar chart representing comparison between % increase in root length at different time periods	69
11	Bar chart representing comparison between percentage increase in root canal dentin thickness of different groups.....	72
12	Bar chart representing comparison between % increase in root canal dentin thickness at different time periods.....	75
13	Bar chart representing comparison between % decrease in apical diameter of different groups.....	77

Fig. No.	Figure	Page
14	Bar chart representing comparison between % decrease in apical diameter at different time periods	79
15	Showing a representative sample of subgroup A: Propolis over empty canal a:preoperative radiograph. b:radiograph two weeks following revascularization protocol. c:radiograph one month following treatment. d:radiograph two months following treatment	80
16	Showing a representative sample of subgroup A: Propolis over empty canal a:preoperative radiograph. b:radiograph two weeks following revascularization protocol. c:radiograph one month following treatment. d:radiograph two months following treatment	81
17	Showing a representative sample of subgroup B: MTA over empty canal a:preoperative radiograph. b:radiograph two weeks following revascularization protocol. c:radiograph one month following treatment. d:radiograph two months following treatment	82
18	Showing a representative sample of subgroup (B); MTA over empty canal a:preoperative radiograph. b:radiograph two weeks following revascularization protocol. c:radiograph one month following treatment. d:radiograph two months following treatment	83
19	Bar chart representing comparison between mean hard tissue formation scores in the different groups.....	86
20	Bar chart representing comparison between mean hard tissue formation scores at different time periods.....	88
21	Bar chart representing comparison between mean vital tissue scores in the different groups	91
22	Bar chart representing comparison between mean vital tissue scores at different time periods.....	93
23	Bar chart representing prevalence of apical closure in the different groups.....	94

Fig. No.	Figure	Page
24	Bar chart representing comparison between prevalence of apical closure at different time periods	96
25	Photomicrograph for sample of subgroup A showing formation of cementum like tissue (x200).....	98
26	Photomicrograph for sample of subgroup A showing formation of cementum like tissue on the inner aspect of the root dentin (x200).....	98
27	Photomicrograph for sample of subgroup A showing pulp like tissue with areas of osteoid like tissue inside the root canal with closure of the apex (X100)	99
28	Photomicrograph for sample of subgroup B at 2 month showing formation of new layer of dentin like tissue on the inner root wall (X200)	99
29	Higher magnification of sample of subgroup A showing fibrous connective tissue with islands of cementum like tissue inside the root canal space (X200).....	100
30	Photomicrograph for sample of subgroup A showing pulp like tissue with areas of osteoid like tissue inside the root canal closure of the apex (X400).....	100
31	Photomicrograph for sample of subgroup B at 1month showing dentin like tissue formation (X200)	102
32	Photomicrograph for sample of subgroup B showing formation of cementum like tissue (x200).....	102
33	Photomicrograph for sample of subgroup B at 1month showing apical closure with dentine like tissue formation (X200).....	103
34	Photomicrograph for sample of subgroup B showing pulp like tissue with areas of osteoid like tissue inside the root canal with closure of the apex (X100)	103

LIST OF TABLES

Table No.	Table	Page
1	Statistical data of antimicrobial effect of tested materials and control groups.....	61
2	Statistical data of bacterial count for each material after 3 weeks	63
3	Percentage changes in CFU of bacterial counts for tested materials and control groups.....	64
4	Comparison between % increase in root length of different groups at different time periods	67
5	Comparison between % increases in root canal dentin thickness of different groups at same period	71
6	Comparison between % increase in root canal dentin thickness at different time periods.	73
7	Comparison between % decrease in apical diameter of different groups at same period.....	76
8	Comparison between % decrease in apical diameter of different groups at different time periods	78
9	Comparison between hard tissue formation scores of different groups at different observation periods.....	86
10	Comparison between hard tissue formation scores at different time periods for the same group.....	88
11	Comparison between vital tissue scores of different groups at the same period	90
12	Comparison between vital tissue scores at different time periods for the same group.....	92
13	Comparison between presences of apical closure in different groups	94
14	Comparison between presences of apical closure at different time periods	96

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 Davey¹ 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.