

In vitro* Effect of Ethanolic Extract of Propolis Toward the Growth of *Enterococcus faecalis

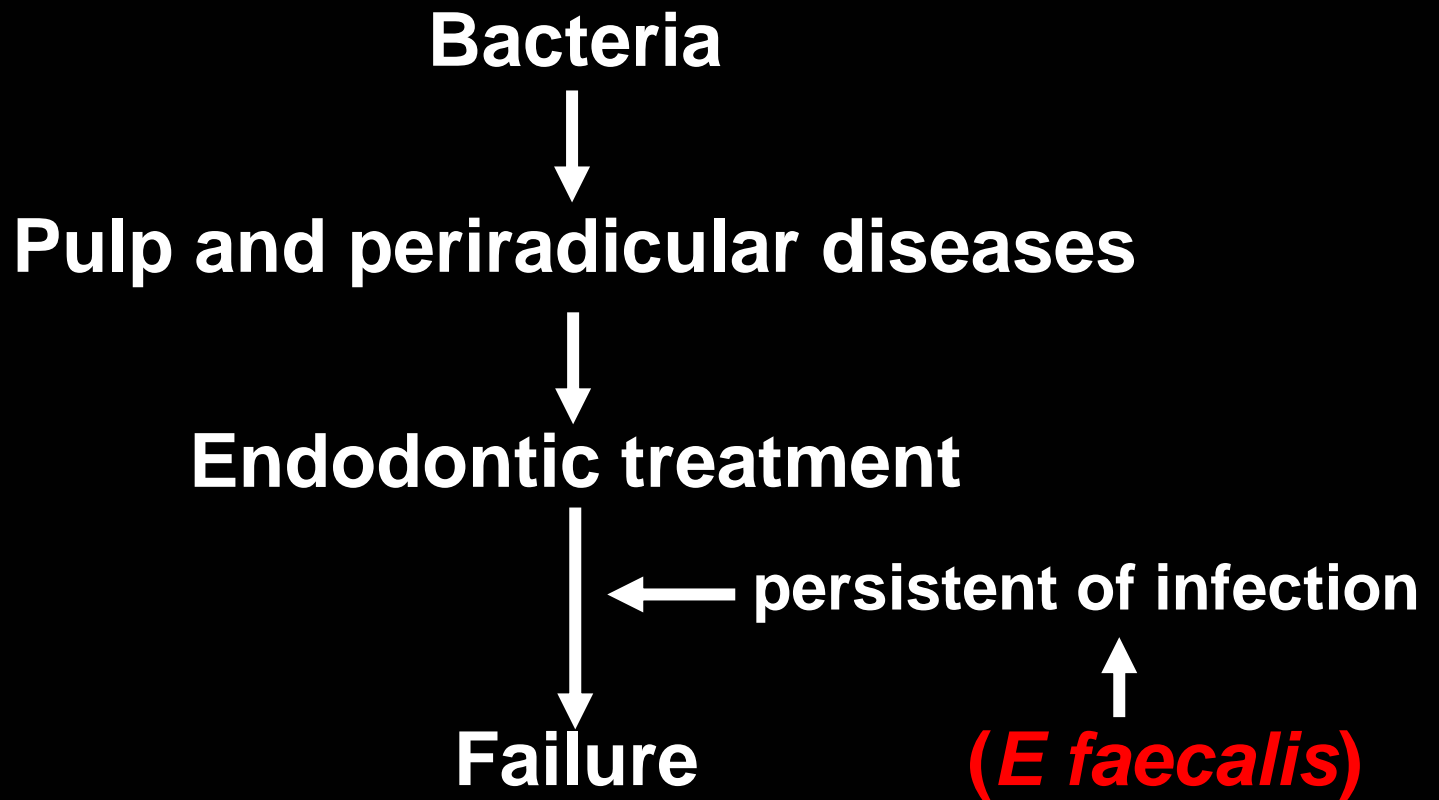


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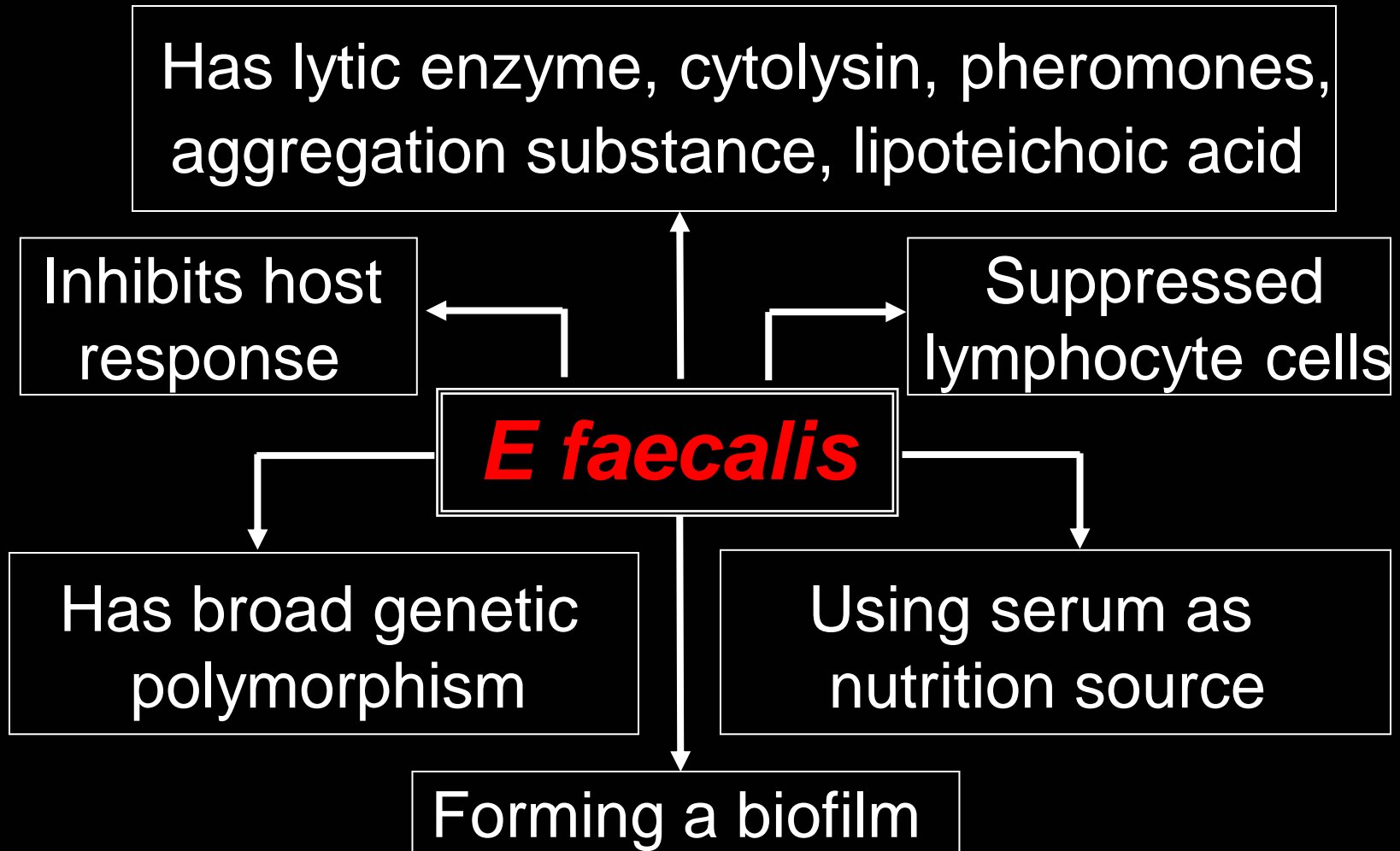
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INTRODUCTION

Background



Virulence factors of *E faecalis*



Propolis

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graph TD; Propolis --> Conservative_dentistry; Propolis --> Periodontology; Propolis --> Oral_surgery; Propolis --> Oral_medicine; Conservative_dentistry --> 1; Conservative_dentistry --> 2; Conservative_dentistry --> 3; Conservative_dentistry --> 4; Conservative_dentistry --> 5; Conservative_dentistry --> 6;
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Conservative dentistry

Periodontology

Oral surgery

Oral medicine

1. Suppressed dental pulp inflammation

2. Stimulated collagen fibers in dental pulp

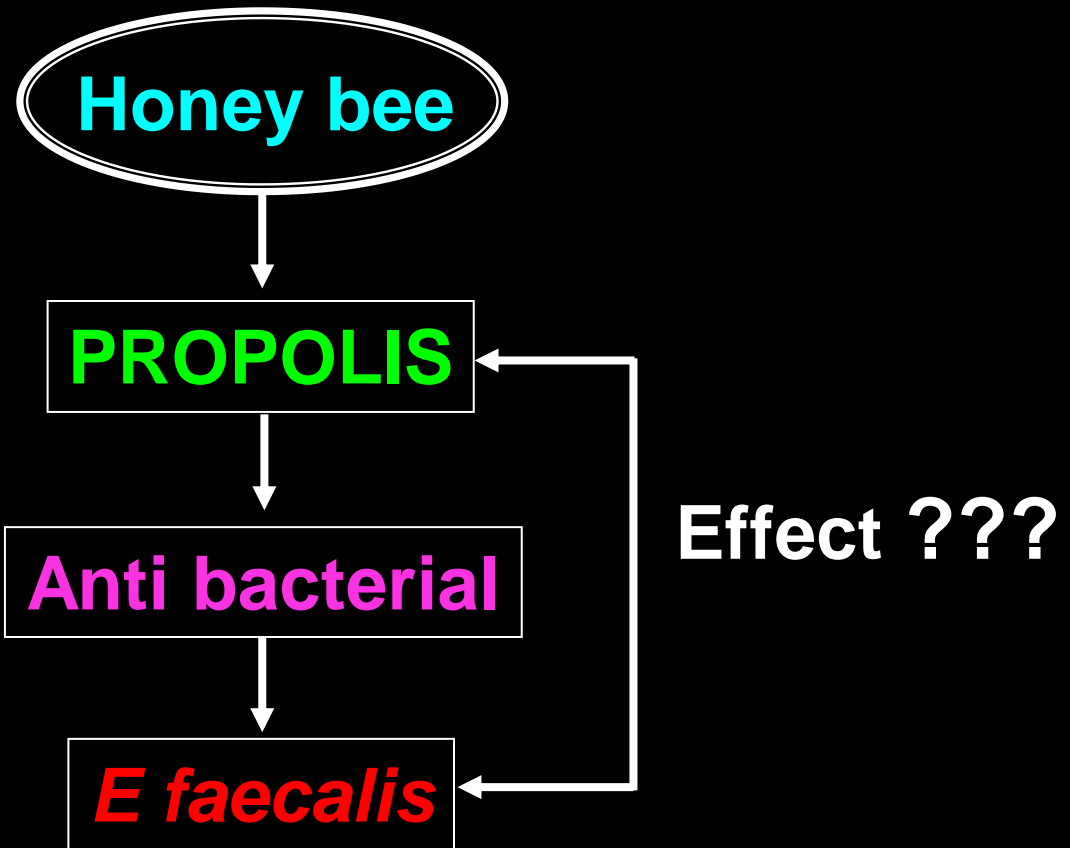
3. Prevent dental caries

4. Gangrene treatment

5. Stimulated reparative dentin

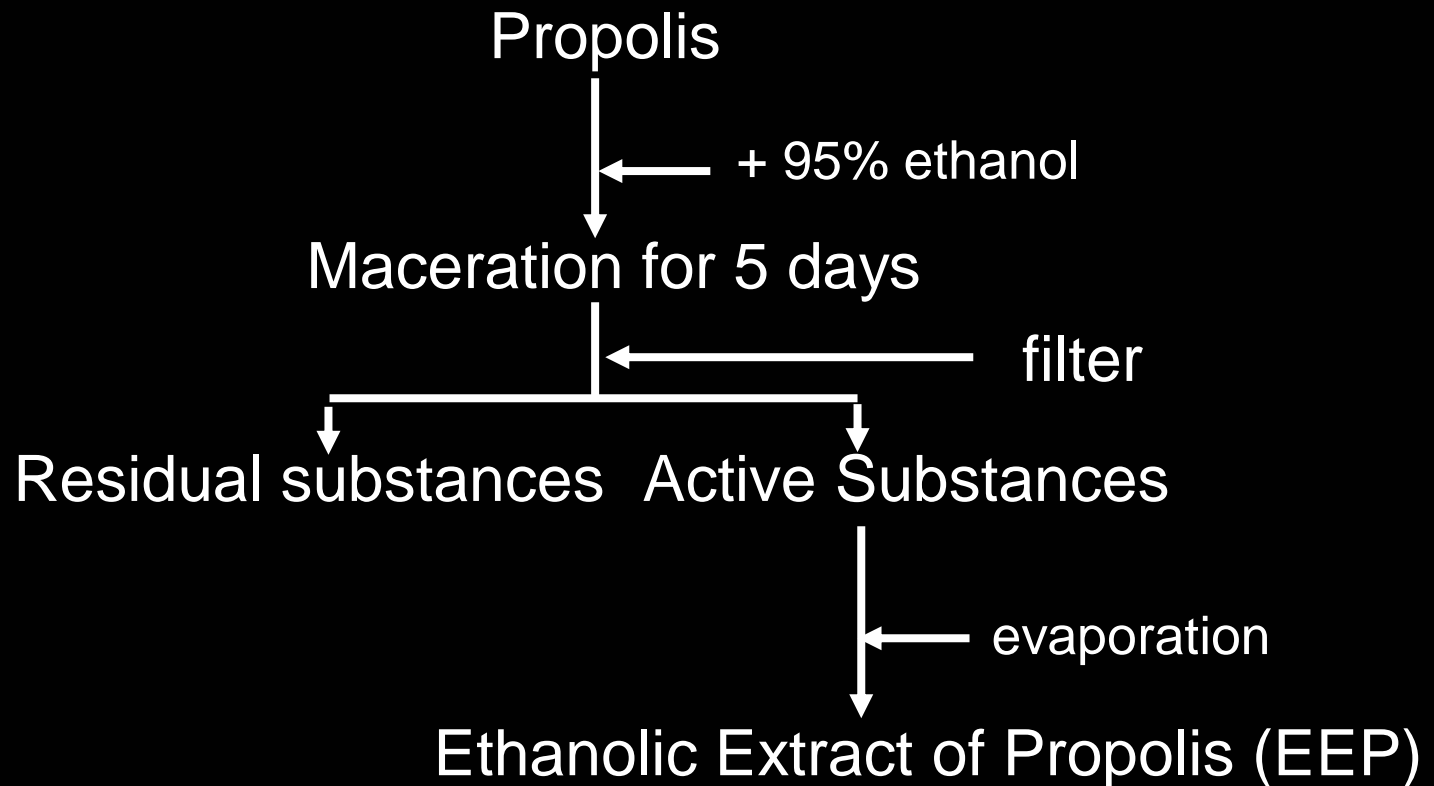
6. Increased enamel mineralization

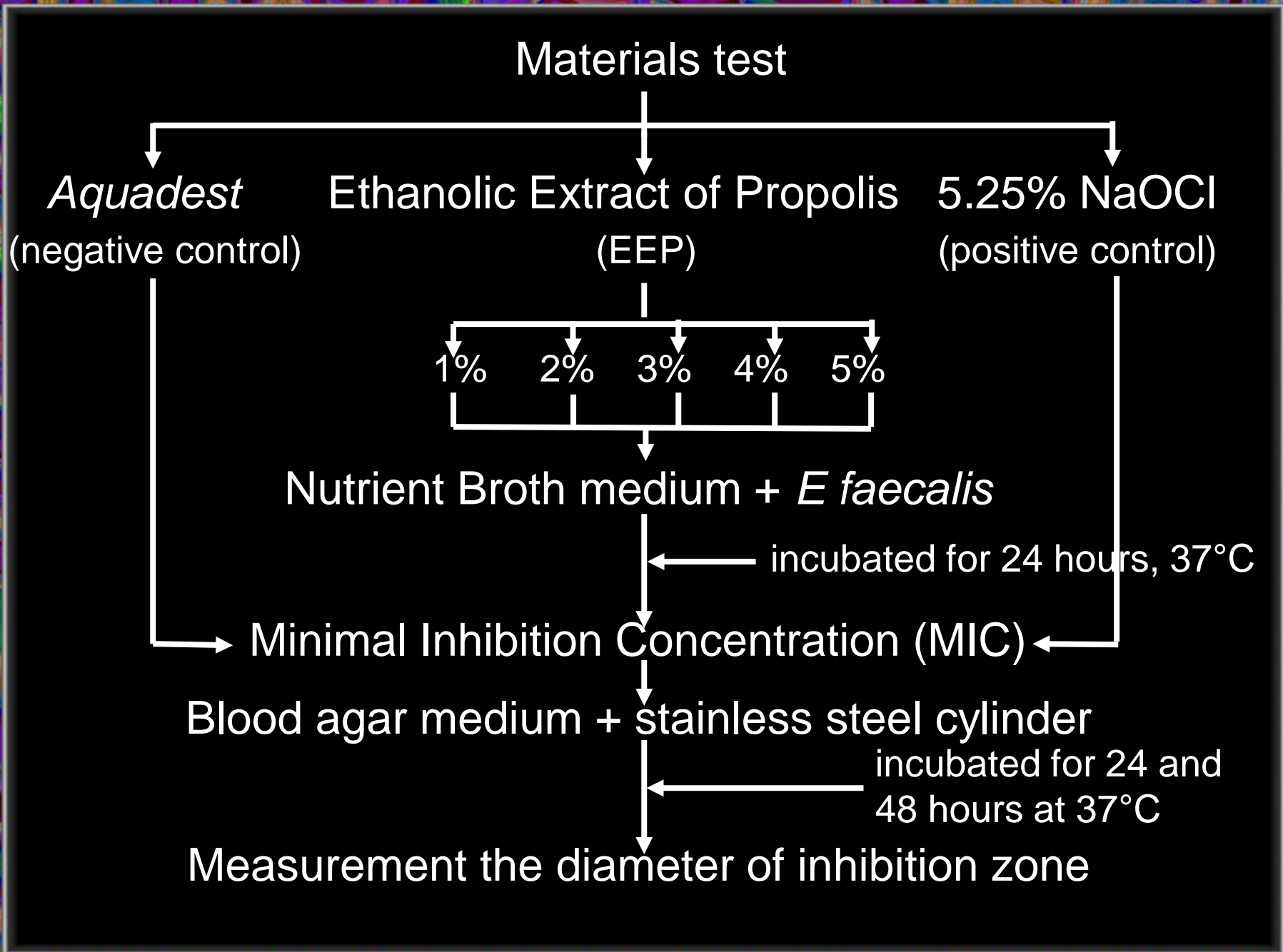
The aim of research



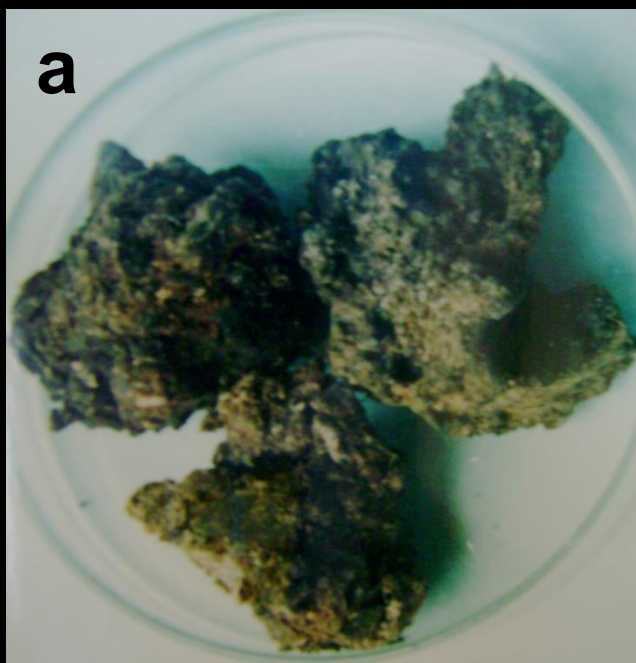
MATERIALS AND METHODS

Type of research : Experiment laboratory

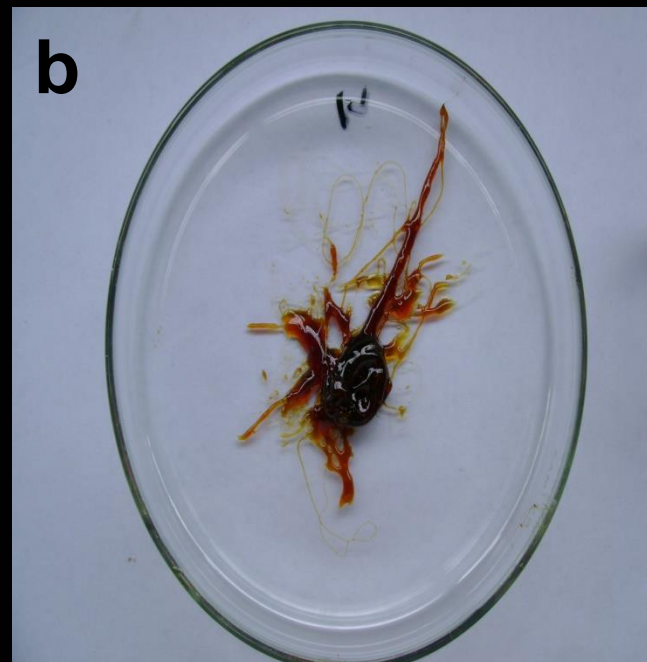




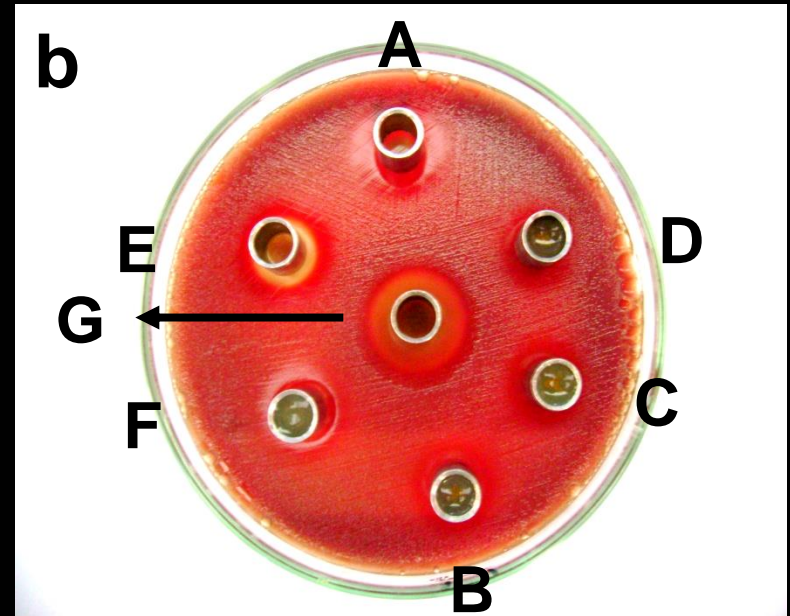
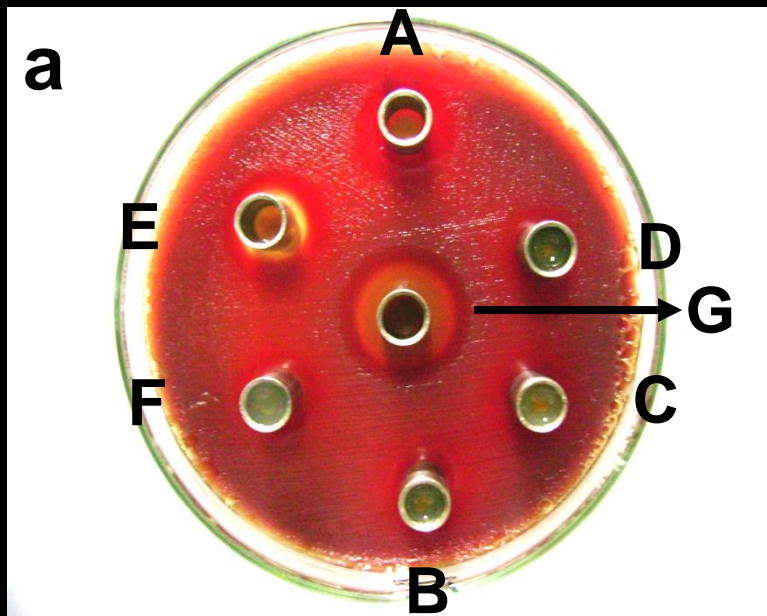
RESULTS



a. Raw propolis



b. Ethanolic Extract of Propolis



The antibacterial activity of EEP toward *Enterococcus faecalis*.

Note : - a (24 hours incubated)

- b (48 hours incubated)

- A (*aquadest*) - B (1% EEP) - C (2% EEP)

- D (3% EEP) - E (4% EEP) - F (5% EEP)

- G (5.25% NaOCl)

Table 1. Mean and standard deviation inhibition zone diameter of each group after incubated for 24 and 48 hours.

Group	Number of sample (n)	Mean (mm)		Standard deviation	
		24 hours	48 hours	24 hours	48 hours
Aquadest	3	0.00	0,00	0.00	0.00
1% EEP	3	3.03	3.86	1.71	1.04
2% EEP	3	3.10	3.93	1.63	0.81
3% EEP	3	3.26	4.20	1.72	0.65
4% EEP	3	3.43	4.23	1.38	0.60
5% EEP	3	3.56	4.33	1.10	0.81
5.25% NaOCl	3	3.00	3.43	0.36	0.60

Table 2. One way ANOVA test result among *Aquadest*, EEP groups, and 5.25% NaOCl after incubatd for 24 hour.

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	26.076	6	4.346	2.596	0.04*
Within Groups	23.687	14	1.692		
Total	49.763	20			

Note: * significant at $P < 0.05$

Table 3. One way ANOVA test result among *Aquadest*, EEP groups, and 5.25% NaOCl after incubatd for 48 hour.

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	27870.3	6	7.132	14.010	0.00*
Within Groups	233542.7	14	0.509		
Total	261413.1	20			

Note: * significant at $P < 0.05$

Table 4. LSD test result of inhibition zone diameter among groups after incubated for 24 and 48 hours.

48 hours \ 24 hours	Ethanollic Extract of Propolis (EEP)						5.25% NaOCl
	<i>Aquadest</i>	1%	2%	3%	4%	5%	
<i>Aquadest</i>	-	0.02*	0.01*	0.00*	0.00*	0.01*	0.00*
1% EEP	0.00*	-	0.73	0.62	0.52	0.90	0.60
2% EEP	0.00*	0.65	-	0.87	0.75	0.82	0.85
3% EEP	0.00*	0.37	0.65	-	0.87	0.71	0.97
4% EEP	0.00*	0.37	0.65	1.00	-	0.60	0.90
5% EEP	0.00*	0.20	0.40	0.69	0.69	-	0.68
5.25% NaOCl	0.00*	0.69	0.40	0.20	0.20	0.10	-

Note: * significant at P < 0.05

Table 5. Two way ANOVA test result the interaction between periods time of incubation and EEP concentrations.

Sources	Sum of Squares	df	Mean Square	F	Sig
Periods time	5.720	1	5.720	5.198	0.030
Concentration	66.343	6	11.057	10.048	0.000
Periods time* concentrations	2.525	6	0.421	0.382	0.884
Total		13			

Note: * significant at $P < 0.05$

DISCUSSION

- *E. faecalis* is considered a persistent endodontic pathogen. This bacteria is a gram-positive, facultative anaerobe, and able to penetrate deep into the dentinal tubules and is difficult to eliminate after biomechanical treatment. Therefore to control and elimination *E. faecalis* still a challenge for the success of endodontic treatment.
- Propolis is a resinous product containing secretions from bee and plant resins, its composition depends on the regional climate, flora, and time of year in which it is collected.

- The biological activities of propolis are mainly related to the presence of phenols and polyphenols, which are aromatic substances that derive flavones, flavonoids, and flavonols and are active against the bacterial cell wall.
- All EEP concentrations which used in this study showed anti bacterial activity against *E.faecalis* where more increase its concentration, the diameter of inhibition zone also more larger (Table 1) although this results was not significant differences statistically ($P>0.05$) (Table 4).
- Interestingly, even the lowest EEP concentration (1%) showed larger diameter of inhibition zone than 5.25% NaOCl as the most common used as irrigate solution in endodontic treatment (Table 1).

- This is a fact that propolis exhibits significant anti bacterial activity against the more resistant, gram-positive facultative and strictly anaerobic species.
- The mechanisms of propolis to inhibit the growth of *E.faecalis* not fully understood. Study by Takaishi-Kikuni dan Schilder found that propolis could occurred diorganization of cytoplasmic membrane cell, partial bacteriolysis and inhibit protein synthesis.
- Alternatively, the anti bacterial effect of propolis due to synergism of several active substances in propolis such as flavonoids, ester acid, ferulic acid, sinamic acid, and caffeic acid phenethyl ester (CAPE) (Bonvehi *et al* and Marcucci).

CONCLUSION

After incubated for 24 and 48 hours, all EEP concentrations could inhibit *E.faecalis* growth *in vitro*. Therefore EEP has potential to be use as an alternative irrigant solution in endodontic treatment.



Thank you for your attention

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