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The Antimicrobial Effect of Honey as Intracanal Medicament (A Comparative Study)

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ABSTRACT

Aims: The current study aims to evaluate the antimicrobial effect of honey as a root canal medicament, and to make a sort of comparison with the currently used root canal medicament (formocresol).**Materials and Methods**: Fifty two uniradicular teeth were chosen. Microbiological sample was obtained from the root canal at the beginning of the first appointment, instrumentation and irrigation of the root canal followed by good dryness for the root canal, application of intra canal medicament depending on the patient group, temporary dressing for the tooth, the samples were then transferred for microbiological study.At the beginning of the second appointment (2-3 days later), the tooth was isolated, the temporary dressing was removed and the microbiological samples of the root canal contents were taken and complete the same sequence in the same manner as previously mentioned with the first appointment. The sample transferred for microbiological study .The same procedure was done at the beginning of the third appointment (2-3 days later) from the second appointment, the microbiological study was done in the Microbiology Laboratory, Department of Dental Basic Sciences, College of Dentistry, University of Mousl. **Results**: Comparing the antimicrobial effect between solutions of honey, formocresol, there is no significant differences between these materials when used as root canal medicament. **Conclusion**: This current study revealed that (H4 20% V/V) honey solution has antimicrobial effect when used as intracanal medicament.

Key Words: Honey, antimicrobial effect, intracanal medicament**.**

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INTRODUCTION

The aims of endodontic therapy are to remove pathogenic bacteria from the pulp system, shape the system appropriately and obturate it in three dimensions with a suitable material which should be done under a septic condition [(1)].

Following thorough instrumentation of an infected root canal, there will be significant reduced number of bacteria, but it is well documented that instrumentation alone can't clean all the internal surface of the root canal. Bacteria can be found on the root canal walls, within the dentinal tubules and in the lateral canals. Antibacterial irrigants and the interappointment intracanal medicaments are needed to kill the remaining microorganisms [(2)].

The intracanal medicaments were designed and proposed for the followings: the antimicrobical activity in the pulp and periapex, the neutralization of the canal remnants to render them inert, the control or prevention of post treatment pain, the introduction of hard tissue formation, the control of exudation & finally the control of inflammatory root resorption[(3)].

History of honey in medicine is related to Stone Age paintings in several locations dating 6000 B.C [(4, 5)]. Honey usually used for the treatment of mouth ulcers, infection and erosion of the gingiva and maxilla after bone grafting and stomatitis during radiotherapy. It is indicated that the honey has a role as therapeutic agent in the oral diseases[(6)].

MATERIALS AND METHODS

1. Patient Selection:

This study was carried out in College of Dentistry, University of Mosul. Fifty two uniradicular teeth were chosen. The patients were divided randomly into four groups:

- Group I: 13 patients, normal saline was used as root canal irrigant and honey at solution of (H4: 20 %) as intracanal medicament
- Group II: 13 patients, normal saline was used as root canal irrigant and

formocresol was used as intracanal medicament.

- Group III: 13 patients, sodium hypochlorite at concentration of 5.25 %

was used as a root canal irrigant solution, and honey at solution of (H4: 20%) as intracanal medicament.

- Group IV: 13 patients, sodium hypochlorite at concentration of 5.25 %

was used as root canal irrigant and formocresol as intracanal medicament.

2. Chemical used:

Sterile normal saline is the most biocompatible irrigant solution because it is inactive with minimum effect on the periapical tissue. While sodium hypochlorite has a tissue dissolving ability and abroad spectrum antimicrobial activity[7].

Tricresol and formaline (formocresol) is a combination of formaline and cresol, it is an example of non specific intracanal medicament [8].

3. Microbiological Process:

Microbiological sample was obtained from the root canal at the beginning of the first appointment. New antisepsis for the operating field was performed to prevent contamination of the sampling by the contents of the coronal pulp and especially after preparation of the access opening [9, 10]. Irrigation followed by good dryness with a sterile paper points for all group as mentioned above was carried on application of medicament which includes two – steps: first the use of sterile paper point size (30 – 50) moisten with the medicament and placed inside the root canal for one minute inserted in the root canal with correct working length.

After that withdraw the paper using sterile dental tweezer. Second step includes a pledget of cotton, about 1/3 of the size of coronal pulp chamber is moistened with the medicament blotted with a dry a cotton roll or spongy, placed in the floor of the pulp chamber with no conscious attempt to introduce the material into the root canals. Application of honey in root canal includes the use of first and second steps but with the application of formocresol that includes the second step only (2). The samples were then transferred for microbiological study.

At the beginning of the second appointment (2-3 days later), the tooth was isolated, the temporary dressing was removed and the microbiological samples of the root canal contents were taken in the same manner as previously mentioned. After that the root canal was then dried with a sterile paper points and application of interappointment intercanal medicament in the same manner which previously mentioned, sealing the canal with a double seal and the sample transferred for microbiological study .The same was done at the beginning of the third appointment (2-3 days later), the microbiological study was done in the same location as mentioned before.

Each screw capped vial was shaken to disperse the sample content evenly, 0.1 ml inoculum was taken from the inoculated Thiogycollate broth, using micropipette, and inoculated on one blood agar plate. Also 0.1 ml inoculum was taken from the inoculated Brain Heart Infusion broth, using micropipette and inoculated in other blood agar plate. The inoculum was streaked by a sterile cotton swab on the culture media. One blood agar plate which was inoculated with Thioglycollate broth was incubated anaerobically and the other blood agar plate which was inoculated with Brain – Heart Infusion broth was incubated under aerobic condition. Both plates were incubated at 37°C for 24 hours. The plates were then examined; the numbers of bacterial colonies were counted [11, 12].

The analysis of the results was carried by the calculation mean and standard deviation; the experimental designs used by the computer program (SAS) were: One way Analysis of Variance at level significance 0.05 – 0.01; Duncan New Multiple

Range Test at level of significance 0.05 and T – test at level of significance 0.05.

RESULTS

From each root canal for all 52 teeth, in group I, group II, group III and group IV, both aerobic and anaerobic bacterial counts were taken at the beginning of the first, the second and the third appointment. The data were tabulated according to the number of bacterial colonies counts on each culture media; the mean and standard deviation for both aerobic and anaerobic bacteria at different appointments were calculated.

Comparing the results at different appointments among the four groups, it was found that the mean bacterial counts (both aerobic and anaerobic) at the beginning of the first appointment was significantly not different (P> 0.05) for all groups. This indicates that the bacterial counts for all groups were comparable before treatment but the mean bacterial counts at the beginning of the second appointment nearly similar for group I, II and III, statistically had no significant difference (P> 0.05), but statistically had significant difference (P< 0.05) with group IV which had a highest bacterial reduction. Also, the mean bacterial counts at the beginning of the third appointment nearly similar for group I, II and III, statistically had no significant difference (P> 0.05), but statistically had significant difference (P< 0.05) with group IV which had highest bacterial reduction this was shown in Tables (1 and 2). Both aerobic and anaerobic bacterial counts were taken at each appointments was shown in Tables (3 and 4).

Table (1): ANOVA and Duncan's New Multiple Range Test for the Antimicrobial effect of Intracanal medicament on the Aerobic Bacteria.

	Df	Sum of Square	Mean Square	F- value	Sig.
Between groups	8	21.449	2.681	162.126	P<0.001
Within groups	126	2.084	0.165	162.126	P<0.001
Total	134	23.533		162.126	P<0.001

Treatment	Mean± SD	Duncan's group
Group I	16.38±3.46	B
Group II	12±2.99	B
Group III	8.5±3.54	B
Group IV	3.5±1.29	A

Table (2): ANOVA and Duncan's New Multiple Range Test for the Antimicrobial effect of Intracanal medicament on the anaerobic Bacteria

	Df	Sum of Square	Mean Square	F-value	Sig.
Between groups	8	26.507	3.313	347.911	P<0.001
Within groups	126	1.2	0.095	347.911	P<0.001
Total	134	27.707		347.911	P<0.001

Treatment	Mean± SD	Duncan's group
Group I	**19.84±2.12**	B
Group II	**14.5±2.13**	B
Group III	**11.5±2.16**	B
Group IV	**5.5±1.41**	A

Table (3): The Mean ± Standard Deviation of the Count of Aerobic Bacteria at Different Appointments for Four Groups.

Groups	Mean ± SD		
	Appointment Number		
	First Appointment	Second Appointment	Third Appointment
Group I	809 ± 15.38	83.46 ± 10.94	16.38 ± 3.46
Group II	819 ± 9.19	77 ± 5.56	12 ± 2.99
Group III	829.5 ± 9.78	69 ± 5.66	8.5 ± 3.54
Group IV	820± 5.41	54 ± 3.69	3.5 ± 1.29

Table (4): The Mean ± Standard Deviation of the Count of Anaerobic Bacteria at Different Appointments for Four Groups.

Groups	Mean ± SD		
	Appointment Number		
	First Appointment	Second Appointment	Third Appointment
Group I	880 ± 14.43	93.84 ± 12.02	19.84 ± 2.12
Group II	888.5 ± 8.09	85.5 ± 5.66	14.5 ± 2.12
Group III	885.5 ± 7.20	76.5 ± 4.57	11.5 ± 2.16
Group IV	875± 5.17	58.5 ± 3.54	5.5 ± 1.41

DISCUSSION

The antimicrobial properties of honey related to different factors which lead to antimicrobial effect. This antimicrobial factors represented by Osmotic effect, acidity, hydrogen peroxide and phytochemical factors [13]. We compared the antimicrobial effect of aqueous solution of honey when used as intracanal medicament with more commonly used intracanal medicament (formocresol) [14].

Honey, used in this study exhibited different antimicrobial activity against aerobic and anaerobic microorganisms isolated from necrotic dental pulp [15]. The treatment of necrotic pulp is very important by elimination of microorganisms from root canals which is attempted to use irrigating solutions during instrumentation and intracanal medicaments [10].

Physiologic saline solution had relatively poor antibacterial activity; however, irrigations with saline solution following hand, sonic or ultrasonic instrumentation have been reported to be almost as effective as 0.5 to 2.5 % sodium hypochlorite irrigations in reducing the number of bacteria in the infected root canals [16]. Sodium hypochlorite had a tissue dissolving ability and abroad spectrum antimicrobial activity. It can rapidly kill vegatitive bacteria, spore forming bacteria, fungi, protozoa and viruses [17,18]

At the beginning of the second appointment for group I, II and III the mean bacterial counts (both aerobic and anaerobic) there were no statistical significant difference (P> 0.05) but the highest reduction in the mean bacterial counts associated with group IV was statistically significant (P< 0.05) when compared with group I, II and III. Although at the beginning of the third appointment for group I, II and III the mean bacterial counts (both aerobic and anaerobic) there were no statistical significant difference (P> 0.05) but the highest reduction in the mean bacterial counts associated with group IV was statistically significant (P< 0.05) when compared with group I, II and III.

CONCLUSION

This result revealed that the (H4: 20 % V/V) aqueous solution of honey had antimicrobial effect when used as interappointment intracanal medicament. Such effect was nearly similar to antimicrobial effect of tricresol and formaline (formocresol). Therefore, honey could be used as a substitute for formocresol as an interappointment intracanal medicament for infected root canals.

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