

Histological Comparison of Honey with Formocresol in Partial Pulpotomy of Deciduous Molars

Covering the tissue with Formocresol or Honey after Pulpotomy

Babra Marium Anwari¹, Mubashir Rasheed², Shazia Naz¹, Rabia Ijaz Yousaf³ and Ayesha Bashir²

ABSTRACT

Objective: The objective of this study is to histologically evaluate the repair of pulpal tissue after partial pulpotomy by covering the pulp tissue with Formocresol or with Honey.

Study Design: Randomized controlled trial study.

Place and Duration of Study: The study was conducted in de'Montmorency College of Dentistry, Lahore in six months time from January 2018 to June 2018.

Materials and Methods: Since the study population were minors, a written informed consent was taken from the parent/guardian after explaining the procedure to them. 140 deciduous molars were randomly assigned for partial pulpotomy with Honey or Formocresol. The treated teeth were radiographically and clinically examined seven days and 60 days prior to extraction. The extracted teeth were then evaluated histologically for pulpal response.

Results: Honey is more effective in a long term therapy. Results prove that Formocresol gave instant relief but was effective more only in short term treatments.

Conclusion: There is prospective of honey as an active biologic pulp dressing agent without affecting the normal function. It is a natural harmless material with a long shelf-life that can replace formocresol.

Key Words: Honey, Formocresol, Pulpotomy, Molar

Citation of article: Anwari BM, Rasheed M, Naz S, Yousaf RI, Bashir A. Histological Comparison of Honey with Formocresol in Partial Pulpotomy of Deciduous Molars. Med Forum 2020;31(12):72-76.

INTRODUCTION

Endodontic treatment of deciduous teeth due to its bizarre internal geometric features such as connections involving furcation and horizontal anastomoses is regarded as highly complicated. This is particularly true for the deciduous first molars with and the mesiolingual canal as the least accessible canal for the mandibular first deciduous molar and the least accessible distobuccal canal in the maxillary first molar. Since the foremost reason of restoration in the pulpectomy procedure is the elimination of organic contents from the canal, a comprehensive knowledge of the root canal morphology is undoubtedly helpful.

The root canals of deciduous teeth differ greatly from those of permanent teeth, and treatment is complicated by apical resorption to allow for eruption of the succedaneous tooth. Surely it is agreed that the best pulpotomy technique should leave the radicular pulp vital and healthy and totally enclosed inside an odontoblast-lined dentin chamber. The ideal pulp dressing material must be bactericidal, nontoxic to the pulp and neighboring structures, encourage healing of the radicular pulp without hindering with the physiological course of root resorption. Haghgoo R¹. Fuks AB². The pioneering medicament used for pulpotomy was formocresol, a mixture of formaldehyde and cresol. Bijimole J³.

¹. Department of Crown & Bridge / OP². de'Montmorency College of Dentistry. Lahore / Punjab Dental Hosp. Lahore.

³. Department of Dentistry, Sharif Medical & Dental College. Lahore.

⁴. Department of Dentistry, Azra Naheed Medical & Dental College, Lahore.

Correspondence: Dr. Babra Marium Anwari. Asst Prof(D) HOD Crown & Bridge Dept. de'Montmorency College of Dentistry. Lahore / Punjab Dental Hosp. Lahore.

Contact No: 0331-4998838

Email: marium_202@hotmail.com

Received: March, 2020

Accepted: August, 2020

Printed: December, 2020

Formocresol pulpotomy has enjoyed a long-standing clinical utilization and accomplishment. Neamotollahi H⁴. there are concerns such as inconsistency, variability in success rate, mutagenic, cytotoxic, allergenic, and some other potential health hazards. Jabarifar SE⁵. It is recommended that a move should be made not only for the reasons relating to the possible toxicity of formaldehyde but to reveal a more modern, biologic approach to pulp therapy in the deciduous dentition. Waterhouse PJ⁶.

Facts based dentistry is being used more and more as a tool to make, assess, and interpret studies to produce clinical guiding principles and conclusions. Bekiroglu N⁷. Honey (Hy) has been used as a natural medication for centuries for the treatment of a variety of disorders as it reduces pain, inflammation, and in duration of

affected area. Ahuja A⁸. Natural honey is known to be harmless to the tissues. It is sterile in nature and has antiseptic, antibacterial and hygroscopic properties. Khan SA⁹.

MATERIALS AND METHODS

The study was a randomized controlled trial conducted in de'Montmorency College of Dentistry, Lahore. Since the study population were minors, a written informed consent was taken from the parent/guardian.

140 cases were collected from the OPD of Paediatric Dentistry Department, de' Montmorency College of Dentistry, Lahore. On clinical examination a tooth with a large carious lesion with normal pulp or reversible pulpitis that showed on periapical radiographs the succedaneous tooth to be at Nolla stage seven or eight of tooth development was included. They were divided in two major groups which were further sub-divided into two sub groups.

Teeth were clinically evaluated, radiographed, pulpotomy procedure according to the specified protocol performed and then extracted. Half of the patients had extractions done on the 07th day and the other half on the 60th day in both the groups.

Same criteria applied for analyzing histologic, clinical and radiographic features 07th day and 60th day after PP. Any tooth requiring extraction before the schedule was considered a failure and was excluded from the study.

The procedure began with a thorough medical history and any implications related to the anticipated treatment. The dental history and characteristics of associated pain were helpful in determining pulp status. History of any traumatic injury to the facial area was explored in depth and recorded for future medical, dental, legal, and insurance purposes.

Each tooth was randomly assigned to either Formocresol (GP FC) or Honey Groups (GP Hy). A total of 140 teeth were a part of the study. All teeth in the study were anaesthetized by block injection, using 2% lidocaine with 1:100,000 epinephrine. The tooth was isolated and it was critically maintained to evade bacterial contamination of pulp during the procedure and any succeeding seepage after the restoration. No instrument used previously was re-introduced to the surgical field.

The procedure included removal of the carious tooth structure and part of roof of pulp chamber with a new sterile bur at high speed and water spray.

RESULTS

In Group-Hy mean age of patients was 10±0.851 years. Minimum and maximum age in this group was 9 and 11 years respectively. In Group-FC mean age of patients was 9.99±0.860 years. Minimum and maximum age of patients in this group was 9 and 11 years.

In Group-Hy there were 26(74.28%) male and 9(25.72%) female patients while in Group-FC there were 24(70.58%) male and 11(31.42%) female patients. At 7th day in Group-Hy 33 patients radiological findings were at grade-1 while 1 patient had grade-2 and 1 patient had grade-3 radiological findings. In Group-FC 31 patients had grade-1, 3 patients had grade-2 and 1 patient had grade-3 radiological finding. At day 7 radiological finding were same in both treatment groups. *p-value*=0.588 While at 60th day in both treatment groups radiological findings were same. [Grade-1=Group-Hy:33, Group-FC:30, Grade-2: Group-Hy:1, Group-FC:3, Grade-3: Group-Hy:1, Group-FC:2] i.e. *p-value*=0.478

Success rate as per operational definition in Group-Hy was observed in 31(88.6%) patients and in Group-FC success of treatment was seen in 34(97.1%) patients at 7th day. It was observed that success rate in Group-FC was high as compared to that of Group-Hy but statistically this difference was not significant. i.e. (*p-value*=0.164) At 60th day success was again seen in both treatment groups. At this point in Group-Hy success of treatment was seen in 33(94.3%) patients and in Group-FC in 30(85.7%) only. Success rate in Group-Hy patients was high as compared to that of Group-FC patients but in terms of *p-value* this difference was not statistically significant. (*p-value*=0.232)

In both treatment groups success rate was 91.4%. No statistically significant difference was seen for success when overall success was determined.

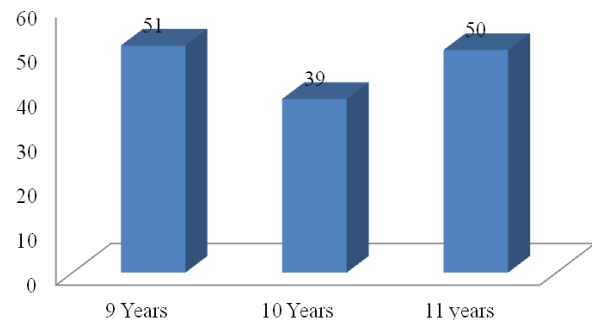


Figure No.1: Age distribution of patients

There were 51 patients in the age group 9 years and in the age group 10 years there were 39 patients. In the age group 11 years there were 50 patients.

At 7th day in Group-Hy07 33 patients radiological findings were at grade-1 while 1 patient had grade-2 and 1 patient had grade-3 radiological findings. In Group-FC07 31 patients had grade-1, 3 patients had grade-2 and 1 patient had grade-3 radiological finding. At day 7 radiological finding were same in both treatment groups. *p-value*=0.588 While at 60th day in both treatment groups radiological findings were same. [Grade-1=Group-Hy60:33, Group-FC60:30, Grade-2:

Group-Hy60:1, Group-FC60:3, Grade-3: Group-Hy60:1, Group-FC60:2] i.e. p-value=0.478 (Table 1).

Table No.1: Radiographic findings in groups at 7th day & at 60th day

		7 th Day		60 th Day	
		Group-Hy07	Group-FC07	Group-Hy60	Group-FC60
Radio-graphic Findings	1	33 (94.3%)	31 (88.6%)	33 (94.3%)	30 (85.7%)
	2	1 (2.9%)	3 (8.6%)	1 (2.9%)	3 (8.6%)
	3	1 (2.9%)	1 (2.9%)	1 (2.9%)	2 (5.7%)
Total		35	35	35	35
Chi-Square Test		1.063		1.476	
p-value		0.588		0.478	

Group-Hy= Honey Group- FC= Formocresol

At 7th day and 60th day histological grades were not having a statistically significant difference in both treatment groups (Table 2).

Table No.2: Histological grade in treatment groups at 7th day & at 60th day

		7 th Day		60 th Day	
		Group-Hy07	Group-FC07	Group-Hy60	Group-FC60
Histologi-cal Grade	0	32 (91.4%)	32 (91.4%)	31 (88.6%)	30 (85.7%)
	1	0(0%)	0(0%)	0(0%)	0(0%)
	2	2(5.7%)	3(8.6%)	3(8.6%)	4(11.4%)
	3	1(2.9%)	0(0%)	0(0%)	1(2.9%)
	4	0(0%)	0(0%)	1(2.9%)	0(0%)
Total		35	35	35	35
Chi-Square Test		1.20		2.15	
p-value		0.549		0.540	

Group-Hy= Honey Group- FC= Formocresol

Table No.3: Success rate in treatment groups at 7th day& at 60th day in relation to age of patients

Age	Time	Success	Group		p-value
			Group-Hy	Group-FC	
9 Years	7 Days	Yes	11(100%)	13(100%)	-
		No	0(0%)	0(0%)	
		Total	11	13	
	60 Days	Yes	14(100%)	12(92.3%)	0.290
		No	0(0%)	1(7.7%)	
		Total	14	13	
10 Years	7 Days	Yes	9(81.8%)	10(100%)	0.156
		No	2(18.2%)	0(0%)	
		Total	11	10	
	60 Days	Yes	8(88.9%)	7(77.8%)	0.527
		No	1(11.1%)	2(22.2%)	
		Total	9	9	
11 Years	7 Days	Yes	11(84.6%)	11(91.7%)	0.588
		No	2(15.4%)	1(8.3%)	
		Total	13	12	
	60 Days	Yes	11(91.7%)	11(84.6%)	0.588
		No	1(8.3%)	2(15.4%)	
		Total	12	13	

Group-Hy= Honey Group- FC=Formocresol

Patients in age group 9 years among them it was seen that success rate in both treatment groups at 7th day and at 60th day did not differ significantly. Same trend was seen in patients who were 10 and 11 years old. But at 7th day success rate was observed to be high in Group-FC and at 60th day success rate was high in Group-Hy. So it can be said that at short term follow up success rate was high in Group-B but not statistically significant and for long term follow up success rate was high in Group-A but not statistically significant. (Table 3)

DISCUSSION

There is no qualm that a reparative, biologic, pragmatic approach to vital pulp therapy in paediatrics is welcome. The devitalization path and investigations to find substitutes for replacing the devitalizing medicaments is not only looked for but is very imperative.

In this study, the clinical and histologic success rates of pulpotomy using Honey in comparison with Formocresol were examined over a period of 07 days and 60 days. Although the teeth treated with Honey demonstrated a slightly lower success rate (88.6%) than those treated with Formocresol (97.1%) at 07th day. A slightly higher success rate of Honey (94.3%) than those treated with Formocresol (85.7%) at 60th day was observed. No statistically significant difference in success rates were found between the groups when overall success was determined ($P > 0.05$).

Verification of the clinical vitality of pulp is still, one of the foremost dilemmas. Histology can confirm the viability of dental pulp, but is not realistic for clinicians, who rely on clinical and radiographic examinations, which do not give a precise evaluation of pulp vitality. It is by and large approved that vital pulp therapy is clinically efficacious if the tooth is symptom less, responds satisfactorily to sensitivity tests and appears normal radiographically. Verification of the clinical vitality of pulp is still, one of the foremost dilemmas. Histology can confirm the viability of dental pulp, but is not realistic for clinicians, who rely on clinical and radiographic examinations, which do not give a precise evaluation of pulp vitality. It is by and large approved that vital pulp therapy is clinically efficacious if the tooth is symptom less, responds satisfactorily to sensitivity tests and appears normal radiographically.

The diagnosis of failure was mainly based upon clinical judgment; it included pre- and intra-operative assessment of pulp status. The texture and colour of the pulp tissue as well as cessation of bleeding after coronal amputation have were as indicators of the status of the radicular pulp. Because more precise diagnostic tools are not available in the clinical situations, some pulpotomies performed on teeth could be histologically contra-indicated. This may be the reason attributed for the pulpotomy failure.

The lower success rate for FC observed in this study is consistent with previous studies that showed decreased success rate of FC with time. Olatosi OO¹⁰.

WHO has estimated the use of Formocresol through air, water and food at 1.5-to 14-mg/ day (mean 7.8 mg/day). The estimated dose of formaldehyde associated with one pulpotomy procedure, assuming a 1:5 dilution of Formocresol placed on a number 4 cotton pellets that has been squeezed dry, is 0.02 - 0.1 mg. Thus, there is no inconsequential risk of carcinogenesis associated with the use of formaldehyde in pediatric pulp therapy. The 1-min application of Formocresol is found to be as effective as 5-min application Godoy FG¹¹ and have found that 1:5 dilution (20% concentration) achieves desired cellular response and faster recovery of the affected cells.

Histological findings by this study confirm that Formocresol has no reparative ability and its action is limited as a fixative agent only. In formocresol group, increased inflammatory cells could be found in pulp. Odontoblastic layer was not intact throughout the dentine pulp complex. Pulp stones were isolated and scattered. Initiation of dentine bridge was not seen at 60 days interval. A zone of atrophy was noted in radicular portion of pulp. *In vitro* investigation has demonstrated the ability of Honey to stimulate cytokine release from bone cells, indicating that it actively promotes hard tissue formation rather than being inert. In Honey group, odontoblastic layer integrity was well maintained. Isolated calcific masses were found. The amounts of pulp stones were more than formocresol group. The pulp was hyperemic, yet less inflammatory cells could be seen compared with formocresol group. Reversal line/resting line were noted. An amorphous eosinophilic layer of new dentine formation with less dentinal tubules could be seen in the coronal portion of pulp. This could be considered as dentine bridge, which represents the pulpotomized regenerating site.

Honey maintains the integrity of the pulp. Dentin bridges formed could be a result of pulp irritation and/or inflammation, or alternatively due to a stimulus from the material placed directly over the exposed pulp. Discrete calcification seen suggest a close relation between nerve fibers and odontoblastic cell differentiation suggesting repair of pulpotomized site. Honey has biological characteristics to be used as a pulpotomy medicament in deciduous teeth. These results are in accordance with study done by Srinivasan D¹².

Through this study we have seen that the success rate is almost equal but FC contains formaldehyde which is an established carcinogen, however honey is a natural product with no side effects and has wound healing capabilities. Furthermore, it is a natural, cheap and harmless material. Despite that FC is still being used in dentistry and as yet there is no known study comparing Honey and Formocresol in Dentistry. Hence through

this study we have evidence that honey is effective in healing and recommend its use in partial pulpotomy in deciduous molars in future.

CONCLUSION

Honey is more effective in a long term therapy. Results prove that Formocresol gave instant relief but was effective more only in short term treatments.

There is prospective of honey as an active biologic pulp dressing agent without affecting the normal function. It is a natural harmless material with a long shelf-life that can replace formocresol.

Honey when applied as a dressing material onto amputated exposed pulp tissue of deciduous molars shall encourage accelerated tissue healing.

Author's Contribution:

Concept & Design of Study:	Babra Marium Anwari
Drafting:	Mubashir Rasheed, Shazia Naz
Data Analysis:	Rabia Ijaz Yousaf, Ayesha Bashir
Revisiting Critically:	Babra Marium Anwari, Mubashir Rasheed
Final Approval of version:	Babra Marium Anwari

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Haghoo R, Abbasi R. A histopathological comparison of pulpotomy with sodium hyochlorite and Formocresol. Iranian Endodontic J 2013;7(2): 60.
2. Fuks AB, et al. Pulp therapy in primary dentition. Curr Opin Dent Oct. 1991.
3. Bijimole J, et al. Calcium Phosphate cement as an alternative for Formocresol in primary teeth pulpotomies. Ind J Dent Res 2013;24(4):522.
4. Nematollahi H, Sahebnaasagh M, Parisay. Comparison of Electrosurgical pulpotomy with Zinc Oxide Eugenol or Zinc Polycarboxylate cements sub-base. J Clin Pediatr Dent 2011;36(2): 133-138.
5. Jabarifar SE, Khademi AA, Ghasemi D. Success rate of Formocresol pulpotomy versus mineral tri oxide aggregate in human primary molar tooth. J Res Med Sci 2004;9(6):55-58.
6. Waterhouse PJ. "New Age" Pulp Therapy: Personal thoughts on a hot debate. Pulp Symposium 2008;34(7 supplement):S47-S50.
7. Bekiroglu N, Mete S, Ozbay G, Yalcinkya S, Kargul B. Evaluation of panoramic radiographs taken from 1056 Turkish children. Nigerian J Clin Prac 2015;18(1):8-12.

8. Ahuja A, Ahuja V. Apitherapy- A sweet approach to dental diseases- Part 1: honey. J Advanced Dent Res 2010;1:81-86.
9. Khan SA, Cheema MS, Quraishi RP. Evaluation of honey as a root canal disinfectant. Proceedings SZPGMI 2005;18(2):91-95.
10. Olatosi OO, Sote EO, Orenuga OO. Effect of Mineral Tri Oxide Aggregate and Formocresol pulpotomy on vital primary teeth; a clinical and radiographic study 2015;18(2):292-96.
11. Godoy FG. Ionomer cements. An SEM study. The journal of clinical paediatric dentistry 18(2),109-113, 1994.
12. Srinivasan D, Jayanthi M. Comparative evaluation of Formocresol and mineral tri oxide aggregate as pulpotomy agent in deciduous teeth. Ind J Dent Res 2011;22(3):385.