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Original Research

Formocresol vs MTA in deciduous teeth treatment- A clinical study

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***ABSTRACT*:**
Background: Maintaining the pulpally involved deciduous teeth in a healthy state until the time of normal exfoliation remains to be one of the challenges for pedodontics. Several materials have become popular as pulpotomy medicaments. Success rate of FC pulpotomy has been 70-97% in the last decades. Concerns have been raised about the toxicity, potential carcinogenicity, cytotoxicity, allergenicity, systemic disturbances, and the possibility of affecting the permanent successors. It seems that the efficacy of MTA is superior to FC which is the gold standard in pulpotomy of deciduous teeth. **Aim of the study:** To compare Formocresol vs MTA in deciduous teeth treatment. **Materials and methods:** The study was performed on 50 deciduous molars of 40 child patients with age ranging between 5-9 years. The caries were removed from the surface of tooth after administering local anesthesia. An access cavity to pulp was made using high speed round but with water spray. Coronal pulp was amputated using a low-speed sterile round bur (No = #6 or No = #8) with water spray, and hemorrhaging was controlled using sterile saline blotted sterile pellets. The patients were recalled for clinical and radiographic examination after 6, 12, 18, 24, and 30 months, and examinations and success rate were determined. **Results:** It was observed that MTA had better success rate as compared to Formocresol for all follow up time lines. Similarly, radiographic success rate was better observed with MTA in comparison to formocresol. **Conclusion**: Within the limitations of the present study, it can be concluded that Formocresol and MTA have fair success rate for treatment in deciduous teeth, however, the success rate of MTA is better than Formocresol. Further studies are required.
Keywords: MTA, Formocresol, deciduous teeth, pulp capping.

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INTRODUCTION:
Maintaining the pulpally involved deciduous teeth in a healthy state until the time of normal exfoliation remains to be one of the challenges for pedodontics. Several materials have become popular as pulpotomy medicaments. [1] The first time formaldehyde containing medicaments were used was in 1874, Formocresol (FC) (a mixture of equal parts of tricresol and formalin) has been used as the most common capping material for pulp fixation for many years.[1, 2]
Success rate of FC pulpotomy has been 70-97% in the last decades. Concerns have been raised about the toxicity, potential carcinogenicity, cytotoxicity, allergenicity, systemic disturbances, and the possibility of affecting the permanent successors.[3] The overall success rates for MTA as a pulpotomy medicament in primary teeth range from 94 to 100 % based upon meta-analysis, systematic reviews and evidence base assessments. [4, 5] It seems that the efficacy of MTA is superior to FC which is the gold standard in pulpotomy of deciduous teeth. [6] Hence, the present study was conducted to compare Formocresol vs MTA in deciduous teeth treatment.

MATERIALS AND METHODS:

The present study was performed on 50 deciduous molars of 40 child patients with age ranging between 5-9 years. The ethical clearance for the study was approved from the ethical committee of the hospital. A written informed consent was obtained from parents or guardians of the participating patients. The procedure was performed by one pediatric dentist under local anesthesia.

Inclusion criteria:

- Symptomless, cariously exposed vital teeth;
- No clinical symptoms or evidence of pulp degeneration, such as history of spontaneous pain and tenderness to percussion, history of swelling or sinus tracts, pathologic mobility;
- No radiographic evidence of pulp degeneration such as internal or external resorption, inter-radicular, and/or periapical bone destruction or pulp stones;
- No clinical evidence of pulp degeneration such as excessive bleeding from root canals.

The caries were removed from the surface of tooth after administering local anesthesia. An access cavity to pulp was made using high speed round but with water spray. Coronal pulp was amputated using a low-speed sterile round bur (No = #6 or No = #8) with water spray, and hemorrhaging was controlled using sterile saline blotted sterile pellets.

FC pulpotomy

A sterile cotton pellet was moistened with the FC solution and blotted dry on another sterile pellet. The pellet was placed directly over the radicular pulp stumps for 5 min and then pulled away from the cavity. Pulp stumps were covered with zinc oxide eugenol (ZOE) cement. Glass ionomer cement was placed over the ZOE cement.

The pulp stumps were covered with an MTA paste obtained by mixing MTA powder with sterile water at a 3:1 powder to water ratio according to manufacturer's instruction. The restorations were completed with composite resin.

The patients were recalled for clinical and radiographic examination after 6, 12, 18, 24, and 30 months, and examinations and success rate were determined.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistically significant.

RESULTS:

Table 1 shows clinical success rate of Formocresol and MTA for treatment in deciduous teeth. It was observed that MTA had better success rate as compared to Formocresol for all follow up time lines. Similarly, radiographic success rate was better observed with MTA in comparison to formocresol. (Table 2 and Fig 2). However, on comparison the results were seen to be statistically non-significant.

Table 1: Clinical success rate of Formocresol and MTA for treatment in deciduous teeth

Follow up period	Formocresol (n=25)	MTA (n=25)	p-value
6 months	36	43	0.2
12 months	34	40	0.6
18 months	30	38	0.06
24 months	26	35	0.2
30 months	22	33	0.3

Figure 1: Clinical success rate

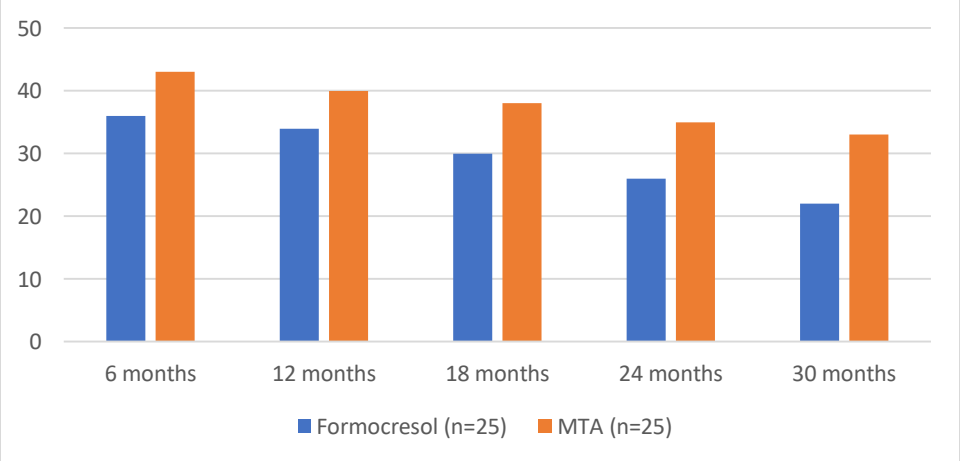
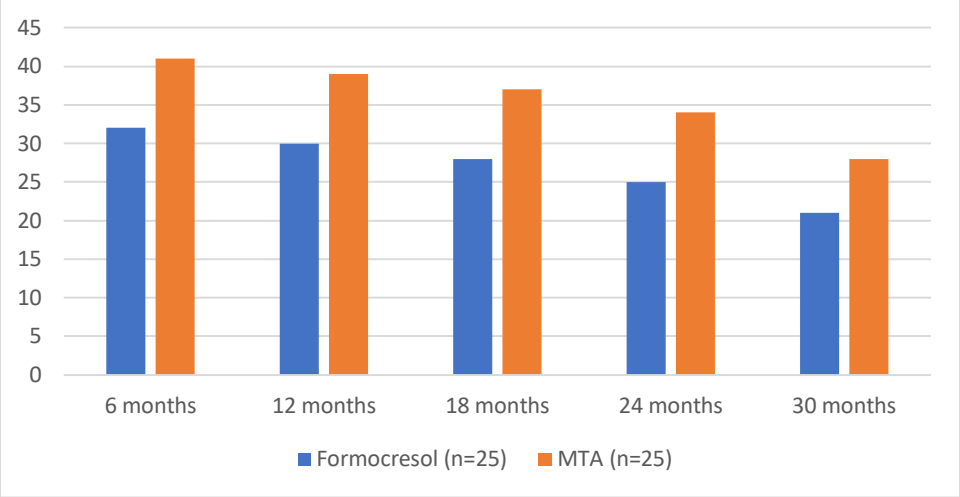


Table 2: Radiographic success rate of Formocresol and MTA for treatment in deciduous teeth

Follow up period	Formocresol (n=25)	MTA (n=25)	p-value
6 months	32	41	0.3
12 months	30	39	0.2
18 months	28	37	0.07
24 months	25	34	0.09
30 months	21	28	0.27

Fig 2: Radiographic success rate



DISCUSSION:

Children from 5 to 8 years of age were selected as per the inclusion and exclusion criteria for the study, irrespective of their sex. The age group was selected taking into consideration the lack of cooperation of children less than 5 years of age and physiologic root resorption (>3/4 of root) above 8 years of age. The first and second primary molars of both arches were included in the present study. Clinically, the success rate was 100% with both the groups at all observation periods. The results are in agreement with the results of various previous studies. [7-10] Yildiz E et al evaluated four different pulpotomy medicaments in primary molars. A total of 147 primary molars with deep caries were treated with four different pulpotomy medicaments (FC: formocresol, FS: ferric sulfate, CH: calcium hydroxide, and MTA: mineral trioxide aggregate) in this study. The criteria for tooth selection for inclusion were no clinical and radiographic evidence of pulp pathology. During 30 months of follow-up at 6-month intervals, clinical and radiographic success and failures were recorded. The differences between the groups were statistically analyzed using the Chi-square test and Kaplan-Meier analysis. At 30 months, clinical success rates were 100%, 95.2%, 96.4%, and 85% in the FC, FS, MTA, and CH groups, respectively. In radiographic analysis, the MTA group had the highest (96.4%), and the CH group had the lowest success rate (85%).

There were no clinical and radiographic differences between materials. They concluded that there were no differences between materials, only in the CH group did three teeth require extraction due to further clinical symptoms of radiographic failures during the 30-month follow-up period. None of the failed teeth in the other groups required extraction during the 30-month follow-up period. Godhi B et al evaluated clinically and radiographically the effects of mineral trioxide aggregate (MTA) and formocresol (FC) as a pulp dressing after coronal pulp amputation (pulpotomy) in primary molars prospectively over a period of 1 year. Thirty-three healthy children, aged between 5 and 8 years, requiring pulp therapy were selected after clinical and radiographic assessment. A total of 50 maxillary and mandibular primary molars were treated by the conventional pulpotomy technique. The teeth were divided into two equal groups. In Group A, FC was used as the pulp dressing agent, and in Group B, MTA was used before restoration with stainless steel crowns. The research employed was a prospective study. The teeth treated were assessed postoperatively after 1, 3, 6 and 12 months. The observations were tabulated and statistically analyzed. Clinically, both the groups showed 100% success at 1, 3, 6 and 12 months. At 3 months, the radiographic success rates of FC and MTA were 92% and 96%, respectively, and at 6 and 12 months, the radiographic success rates of FC and MTA

were 88% and 96%, respectively. They concluded that MTA showed a higher success rate than FC and may be a favorable material for pulpotomy in primary molars whose pulps have been compromised by a carious or mechanical pulp exposure. [7, 8] In the present study, we observed that the clinical and radiographical success rate of MTA was more significant as compared to Formocresol. The results were statistically non-significant. On comparing with previous studies, it was found to be consistnet. Ghoniem N et al compared the outcomes of grey MTA and DFC in primary molar pulpotomies at a teaching institution and a pediatric dental practice. At the teaching institution, 206 primary molars of 122 children were enrolled. At 48-months, 20 teeth treated with MTA and 25 teeth treated with DFC, were available for evaluation. At the private practice, dental records of 245 primary molars of 68 patients were available for evaluation. At 48 months, the results from both sites showed a radiographic success rate of 80 percent for DFC and 95 percent for MTA. The odds of radiographic failure were not affected by study sites. The Cox-regression analysis revealed that patient's age at the time of pulpotomy impacted the "hazard of exfoliation." Each year following the completion of DFC or MTA pulpotomy, there is a 4.6-times-more-likely chance for early exfoliation of the pulpotomized tooth. They concluded that grey MTA is an acceptable alternative for primary molar pulpotomies. El Meligy OAES et al compared the clinical and radiographic success rates of BiodentineTM pulpotomies versus formocresol pulpotomies in children vital primary molars. A randomized, split–mouth study design was used with a sample of 37 healthy children aged 4– to 8–year–old. A total of 56 pairs (112 teeth) of carious primary teeth, 1 pair per child, were selected for treatment. One tooth from each pair was randomly assigned to either the BiodentineTM pulpotomy group or the formocresol pulpotomy group. Children were followed–up at 3, 6 and 12 months for clinical evaluation and at 6 and 12 months for radiographic evaluation. At 12 months, the clinical success rates of both BiodentineTM and formocresol groups were 100%, while the radiographic success rates for BiodentineTM and formocresol groups were 100% and 98.1%, respectively. There was no statistically significant difference between both groups (P=1). The only observed radiographic failure was furcal radiolucency in the formocresol group at 12–month interval. Pulp canal obliteration was radiographically observed in 10/56 (17.9%) and 7/56 (12.5%) cases in the BiodentineTM and formocresol groups, respectively. They concluded that both BiodentineTM and formocresol pulpotomy techniques demonstrated favorable clinical and radiographic outcomes over a 12-month period without any significant difference. [9, 10]

CONCLUSION:

Within the limitations of the present study, it can be concluded that Formocresol and MTA have fair success rate for treatment in deciduous teeth, however, the success rate of MTA is better than Formocresil. Further studies are required.

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