

## ORIGINAL ARTICLE

# ASSESSMENT OF ZINC OXIDE EUGENOL AND VITAPEX FOR ENDODONTIC THERAPY OF NON-VITAL PRIMARY TEETH: A COMPARATIVE STUDY

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### ABSTRACT:

**Background:** Endodontic therapy has been advocated since long time as a method for retaining those primary teeth which would otherwise be lost. Zinc oxide and eugenol (ZOE) paste was the first root canal filling material to be recommended for primary teeth, as described by Sweet in 1930. Another material being used is a premixed calcium hydroxide and iodoform paste (Vitapex) and is claimed to be a nearly ideal root canal filling material for primary teeth. Hence, we compared the effect of ZOE and Vitapex for carrying out endodontic therapy of necrotic primary teeth. **Materials & methods:** The present study was conducted in the paediatric dental wing and included assessment of 116 primary teeth with non-vital pulp tissue from 2013 to 2014. Complete clinical and radiographic assessment of the patients was done pre-operatively. In the ZOE group, a homogenous and thin mix of ZOE paste (without setting accelerators) was prepared and paper points covered with the material were used to coat the root canal walls. In the Vitapex group, the premixed paste was packaged in a syringe with a number of disposable tips. All the results were analyzed by SPSS software. **Results:** Number of cases presenting with pain were 105. 55 and 45 were the cases which presented with fistula and intra-oral swelling. In cases in which ZOE was used, 18.9 percent showed short fillings while in cases where Vitapex was used, 6.8 percent showed short fillings. **Conclusion:** In comparison with ZOE, Vitapex might offer successful results as a filling material following pulpectomy in primary non-vital teeth,

**Key words:** Endodontic, Vitapex, ZOE

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## INTRODUCTION

It has been as early as since 1930s that endodontic therapy has been advocated as a method for retaining those primary teeth which would otherwise be lost. Zinc oxide and eugenol (ZOE) paste was the first root canal filling material to be recommended for primary teeth, as described by Sweet in 1930.<sup>1-3</sup> Since then, several authors have reported moderate to high success rates in preserving chronically infected teeth using this material. Another material being used is a premixed calcium hydroxide and iodoform paste (Vitapex) and is claimed to be a nearly ideal root canal filling material for primary teeth.<sup>4</sup> Calcium hydroxide has been used virtually as an all purpose medicament in dentistry. Recently, it has been used as a root canal filling material in primary teeth with considerable success.<sup>5, 6</sup> The combination of antibacterial, resorbable, and tissue compatible properties make it feasible for use in primary teeth.<sup>7</sup> Hence, we compared the effect of ZOE and Vitapex for carrying out endodontic therapy of necrotic primary teeth.

## MATERIALS & METHODS

The present study was conducted in the paediatric dental wing and included assessment of 116 primary teeth with non-vital pulp tissue from 2013 to 2014. Complete clinical and radiographic assessment of the patients was done pre-operatively. The presence of soft-tissue abscesses or sinus tracts around the tooth; evidence of pathologic processes on the radiographs, ranging from slight thinning of the trabecular pattern to large areas of radiolucency in the furcation and/or periapical region; or little or no pulp tissue remaining when the pulp chamber was entered were the criteria for selection of the teeth included in the study. Teeth were excluded when they were not restorable or if they had a perforated pulpal floor. Patients with significant medical problems were also excluded, as were teeth with evidence of internal or external root resorption involving more than onethird of the root length. Treatment for each of the teeth involved was carried out over two visits. At the first appointment, a complete pulpotomy was performed. Efforts were made to remove all necrotic tissue from the pulp chamber using a sharp spoon excavator before irrigation with normal saline. A formocresol-moistened

cotton pledget was then placed in the pulp chamber and sealed with Zinc-Oxide BP as temporary restoration. At the second visit, which was usually 1– 2 weeks later, and before entering to the root canals, the length of the tooth from the mesial or distal cusp to the apex of the root was measured on the radiograph. All the cases were divided into two study groups. In the ZOE group, a homogenous and thin mix of ZOE paste (without setting accelerators) was prepared and paper points covered with the material were used to coat the root canal walls. In the Vitapex group, the premixed paste was packaged in a syringe with a number of disposable tips. When the root canals were judged to be well filled, periapical radiographs were taken to assess the adequacy of fillings. All the clinical and radiographic details at various time intervals of the follow-up were recorded. All the results were analyzed by SPSS software. Chi square and one way ANOVA test was used for the assessment of level of significance.

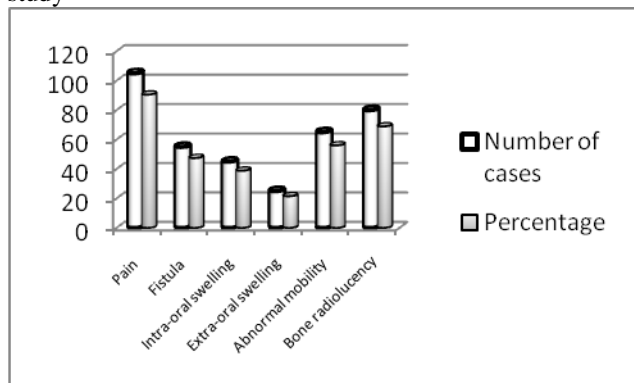
**RESULTS**

**Table 1** highlights the clinical and radiographic findings in the present study. Number of cases presenting with pain were 105. 55 and 45 were the cases which presented with fistula and intra-oral swelling. **Graph 1** shows the clinical and radiographic findings in the present study. **Table 2** shows the immediate post-operative assessment of endodontic treatment in both the study groups. In cases in which ZOE was used, 18.9 percent showed short fillings while in cases where Vitapex was used, 6.8 percent showed short fillings.

**Table 1:** Clinical and radiographic findings in the present study

Parameter	Number of cases	Percentage
<b>Pain</b>	105	90.5
<b>Fistula</b>	55	47.4
<b>Intra-oral swelling</b>	45	38.8
<b>Extra-oral swelling</b>	25	21.5
<b>Abnormal mobility</b>	65	56.0
<b>Bone radiolucency</b>	80	68.9

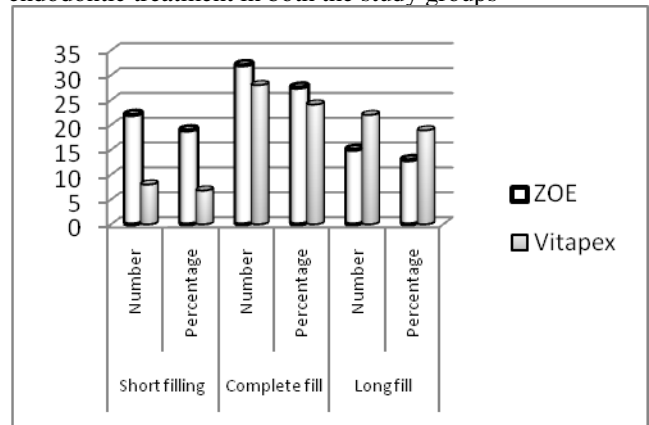
**Graph 1:** Clinical and radiographic findings in the present study



**Table 2:** Immediate post-operative assessment of endodontic treatment in both the study groups

Variable		ZOE	Vitapex
<b>Short filling</b>	Number	22	8
	Percentage	18.9	6.8
<b>Complete fill</b>	Number	32	28
	Percentage	27.5	24.1
<b>Long fill</b>	Number	15	22
	Percentage	12.9	18.9

**Graph 2:** Immediate post-operative assessment of endodontic treatment in both the study groups



**DISCUSSION**

One of the common dental problems affecting a major paediatric population of the world is premature loss, due to pulp involvement, of primary teeth. Retention of pulpally involved primary tooth to preserve arch space is preferable where endodontics, often remains the only option.<sup>8</sup> Thus, the material used for filling of root canals in primary teeth should possess the optimum requirement of being antibacterial, resorbable at the same rate as that of the tooth root, harmless to periapical tissues, and developing permanent tooth bud.<sup>9</sup> In addition, it should easily fill the canals, adhere to the walls, not shrink, easily resorb if passed beyond the apex, be easily removed if necessary, be radio opaque and cause no discoloration of the tooth.<sup>10</sup> Zinc oxide eugenol is one of the most widely used preparations for obturation of primary tooth pulpectomies. It has been reported to be irritating to periapical tissues, cause necrosis of bone, cementum and alter the path of eruption of the succedaneous tooth when extruded beyond the apex of the tooth when used as an obturating material.<sup>11</sup> Hence, we compared the effect of ZOE and Vitapex for carrying out endodontic therapy of necrotic primary teeth. In the present study, we observed that endodontic therapy of necrotic primary teeth with either ZOE or Vitapex as a root canal filling material is a successful procedure. All the cases in the Vitapex group were clinic-radiographically successful after one year follow-up. Gupta et al evaluated both clinically and radiographically, the efficacy of zinc

oxide eugenol (ZOE) and Metapex as root canal filling material in primary teeth. Forty-two necrotic primary teeth in two groups of children in the age group of 4-7 years were obturated with ZOE and Metapex and were followed up clinically and radiographically for a period of 6 months postoperatively. The overall success rates of ZOE and Metapex were 85.71% and 90.48%, respectively. Both ZOE and Metapex gave encouraging results; however, Metapex can be used more safely whenever there is a doubt about the patient's return for follow-up.<sup>12</sup>

Pinto et al compared clinically and radiographically the use of zinc oxide and eugenol cement (ZOE) and a commercial calcium hydroxide and polyethylene glycol-based paste (Calen®) thickened with zinc oxide as root canal-filling materials for primary teeth with pulp necrosis secondary to trauma within 18 months of follow up. Eligible patients of both genders aged 2 years and 6 months to 5 years and 10 months who had been referred for dental treatment at a pediatric dental trauma service and presented at least one anterior primary tooth (central and/or lateral incisor) with pulp necrosis secondary to traumatic injury were selected. Twenty-six children (n=31 teeth) with mean age of 3.4 years met the inclusion criteria and were enrolled after parental written consent. Clinical success after 18 months of follow up was considered as absence of pain, tooth mobility or fistula, and radiographic success as the partial or total remission of apical periodontitis, absence of pathological root resorption or presence of new bone formation. Eighteen months after treatment, the teeth obturated with ZOE and Calen®/ZO presented statistically similar (Fisher's exact test; P >0.05) success rates of 93.3% and 87.5%, respectively. Their results showed the clinical and radiographic outcomes for Calen /ZO to be equal to those for ZOE after 18 months, suggesting that both materials can be indicated for obturating primary teeth with pulp necrosis after trauma.<sup>13</sup>

Chen et al compared clinical and radiographic success rates of a modified primary root canal filling (ingredients: zinc oxide-eugenol, iodoform and calcium hydroxide, MPRCF) vs. zinc oxide-eugenol cement (ZOE) and calcium hydroxide/iodoform paste (Vitapex) in pulpectomized primary molars at the end of 6 and 12 months, and to evaluate the degradation of materials in the root canals and in apical area. In the study, 160 primary molars from 155 children (the average age: 5.88±1.27 years) that met the inclusion criteria were allocated to one of the three materials via block randomization. A two-visit pulpectomy was performed by an investigator. The clinical and radiographic diagnoses were blindly assessed by other two investigators. At the end of 6 and 12 months, the ZOE and MPRCF success rates were 100% both in clinical and radiographic evaluation. The Vitapex group showed the clinical success of 100% at the end of 6 months and 94.5% at the end of 12 months. Radiographic evaluation for the Vitapex group showed 80.4% success at the end of 6 months and 60.7% at the end of 12 months. No statistically

significant differences were noted at the end of 6 months in the three groups both in clinical and radiographic evaluation. The success rates in clinical and radiographic evaluation at the end of 12 months for ZOE and MPRCF groups were not significantly different, and better than those for Vitapex group with statistically significant difference. The completely resorb rate of excess extruded extraradicularly were 14.3%, 100% and 71.4% for ZOE, Vitapex and MPRCF at the end of 12 months. The rates of resorption of material at the same rate of the root were 5.8%, 7.2% and 40.9% for ZOE, Vitapex and MPRCF at the end of 12 months. MPRCF, a mixture of zinc oxide eugenol and iodoform with calcium hydroxide can be used as a root canal filling material in primary teeth, taking account of the success rate and resorbing at a similar rate with the roots of the primary teeth.<sup>14</sup>

## CONCLUSION

From the above results, the authors conclude that in comparison with ZOE, Vitapex might offer successful results as a filling material following pulpectomy in primary non-vital teeth.

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