



## COMPARATIVE STUDY OF CHELATION VALUE OF SEVENTEEN PERCENT SELF DEVELOPED AND COMMERCIALY AVAILABLE ROOT CANAL LUBRICANTS

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### ABSTRACT

The main objective of this study is to compare chelation values of 17% self developed & commercially available root canal Lubricants or dental chelating gels as well as to see whether their performance depends on the chelation value or not. The Chelating agent bounds  $\text{Ca}^{2+}$  ions of the smear layer & the extent of chelate formation between chelating agent and metal ion is nothing but Chelation Value. Sodium carbonate indicator method is used for determinations of chelation value. Commercially available gel incorporated in this study was File Rite which has little bit higher chelation value. Self developed chelating gel or root canal lubricants have comparatively lower chelation value. Root canal lubricants having higher chelation value should perform better in shaping & cleaning of root canal better. However because of slight difference in chelation value of self developed & commercially available gel, no significant difference was found out as root canal lubricants, when applied in root canal for 5 minutes.

**Keywords:** Root Canal lubricants, Chelation Value, Shaping & Cleaning.

### INTRODUCTION

Instrumentation is made easier by using lubricants such as EDTA<sup>1,2</sup>. Lubricant reduces friction between the canal wall and an endodontic instrument during root canal. Whenever canal is lubricated, removal of dentin becomes easier by mechanical instrumentation or hand instrumentation. Instrument lubrication can be easily accomplished using chelating agent<sup>3</sup>. Canal wall containing dentinal tubules or smear layer are removed using 17% EDTA Chelants. A chelating agent or chelants are chemicals that form soluble complex molecule with certain metal ions such as  $\text{Ca}^{2+}$  to form ring shaped bonds so that they cannot easily react with other element or ions to form precipitate or scale<sup>5</sup>. Chelants or chelating agents in dentistry binds with calcium and carry that calcium out of root canal<sup>6</sup>. Thus chelating agents in the form of gel helps in cleaning & shaping of root canal. Chelating agents are available in the market includes BAPTA, DTPA, EGTA, DCTA, NTA, EDTA, etc. Among these EDTA is the most widely used root canal lubricant in endodontic. The major roles of chelating agents in dental chelating gel or root canal lubricant are: 1) Acts as a chelating agent for the dentin wall & debris i.e. it helps in removal of smear layer by chelating with inorganic components of dentine. 2) Thus it helps in easier cleaning & shaping of root canal. 3) Lubricates the root canal & facilitates endodontic preparation. 4) Inside the root canal it acts as an irritant. To overcome these problems chelating agents in the form of gel are used by dentist<sup>7</sup>. All the above functions depend on the chelation value<sup>8</sup>. The effectiveness of root canal lubricant could be increased by increasing its chelation value. The poor performance or ineffectiveness may be because of less chelation value. In dentistry, these chelating agents are used in the form of gel in terms of percentage. From the chelation value study we can judge whether the chelating agent having higher chelation value is more effective or chelating agent having less chelation value is minimum effective or Effectiveness of chelation is independent on chelation value.

### MATERIALS AND METHODS

#### Materials

Root Canal Lubricants used for this study includes File – Rite, Prep-Rite from Pulp – Dent Corporation & self developed gel. Self developed gel was prepared using chelating agent and suitable gel base manufactured in India. Commercially available gel File – Rite, Prep – Rite was purchased from Pulpdent. S. D. Fine make chemicals are used for determination of chelation value. The sodium carbonate indicator method is used for evaluation of chelation value of self developed as well as commercially available root canal lubricant gel.

#### Methods

##### Preparation of the reagents

1. 1N NaOH: Dissolved 40g NaOH in distilled water & diluted to 1 liter with distilled water.
2. 2%  $\text{Na}_2\text{CO}_3$ : Dissolved 2g sodium carbonate in distilled water & diluted to 100ml with distilled water.
3. 0.5N  $[\text{CH}_3\text{CO}]_2 \text{Ca}$ : Dissolved 39.543g dry calcium acetate in distilled water and diluted to 1 liter with distilled water.

##### Chelation Value Determination

In a beaker about 5g samples of 17% self developed root canal lubricant gel was taken. In order to dissolve the sample completely, 50ml distilled water was added. In pipette, 10ml of 2%  $\text{Na}_2\text{CO}_3$  was taken and added into the beaker with stirring. To make the volume to 100ml, Sufficient distilled water was added. 1N NaOH was used to adjust pH to 11.2. Solution in a beaker was then titrated against 0.5N calcium acetate with stirring & by maintaining constant temperature of  $25^\circ\text{C}$  & pH 11.2 till a distinct permanent turbidity appears. Chelation value in mg of  $\text{CaCO}_3$  / g of sample was calculated using the formula

$$\text{Chelation Value} = \text{B. R.} \times 25 / \text{Wt. of Sample in gm}$$

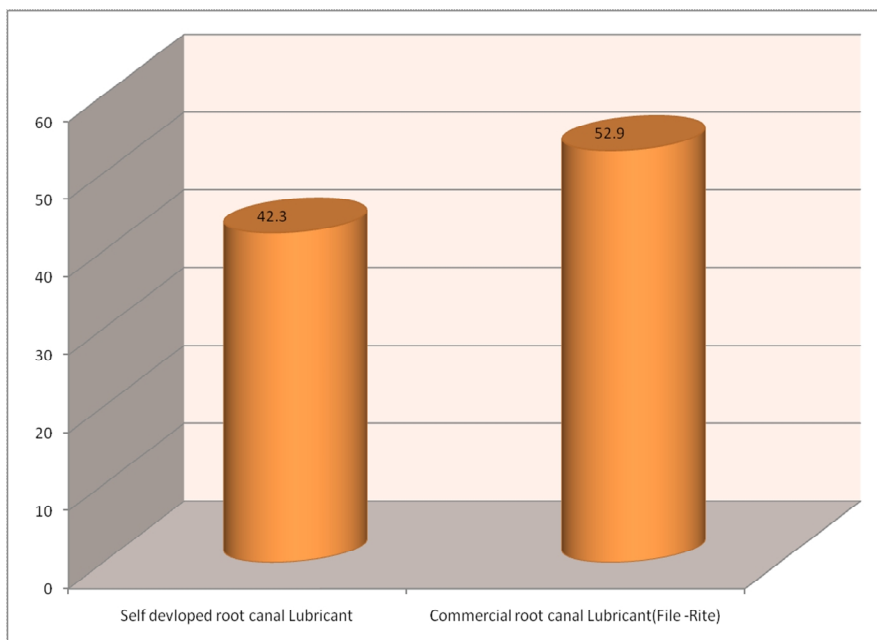
Chelation value of File – Rite was also determined using the similar procedure.

**RESULTS**

The result obtained for chelation value for self developed and commercially available root canal lubricant gels are shown in the Table 1

**Table 1: Chelation value of self developed & commercially available Root Canal Lubricant Gel**

Root Canal Lubricant	Chelation Value
Self Developed	42.3
Commercial Gel - File Rite	52.9



**Figure 1: Graphical representation of Chelation value of self developed & commercially available Root Canal Lubricant Gel**

**DISCUSSION**

Figure 1 indicates that File Rite (52.9) has higher chelation value as compared to Self Developed root canal lubricant Gel (42.3). The result of this study showed that the File Rite shows little bit better performance in lubrication, removal of smear layer and in cleaning and shaping of root canal as compared to the self developed Root Canal Lubricant gel over a period of application for 1 minute in root canal since it has slightly higher chelation value as compared to self developed Root Canal Lubricant gel. On the contrary, no significant difference has been found when self developed root canal lubricant as well as commercially available lubricant such as File Rite was applied in root canal for 5 minutes with respect to performance in lubrication, removal of smear layer and in cleaning and shaping of root canal. It may be because of slight difference in chelation value. It has been also observed that method is not applicable for root canal lubricant in the form of paste or containing urea peroxide in glycol base such as Prep Rite from pulp Dent Corporation, since determination of end point becomes difficult because of formation of pre-precipitate.

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