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Original Article

Study of physico–chemical properties of various concentrations of self developed root canal lubricant

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ABSTRACT

Background and aim: The major aim of this work is to study the physico–chemical properties of different concentrations of self developed root canal lubricant gel in order to standardize the formulations and to observe its effect on the performance.

Materials and methods: The different concentrations of self developed root canal lubricant gel such as 10%, 24% & 31% was prepared and their physico–chemical properties such as appearance, Solid content, 5% aqueous solution pH, Moisture content, B. F. Viscosity and 5% aqueous solution stability etc. are studied.

Results: From the experimental study, it was observed that there is no remarkable difference in the physical appearance of the root canal lubricant gel. Solid content goes on increasing and moisture content goes on decreasing as concentration of EDTA increases.

Conclusion: The chelating efficiency, cleaning & shaping of root canal goes on increasing as percentage of EDTA increases i.e. solid content increases. Efficiency of lubrication was also found to be better in highly concentrated formulation. B. F. Viscosity of the formulations is always kept similar by adjusting quantity of rheology modifier in order to get good handling characteristics. From 5% aqueous solution stability, it is observed that gel is highly stable.

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1. Introduction

The study of present invention involves evaluation of physico–chemical properties of the self developed root canal lubricant as one of the established and potential endodontic irrigant prepared from chelating agent and rheology modifier manufactured in India. Study of physico–chemical properties was carried out in order to standardize the formulations. Generally the formulations may be in the form of solid, liquid

or gel. Among these gels formulation is more preferred since it is easy to handle and safe and also have few advantages like they have localized effect with slight side effects.^{1–3}

Root canal lubricants in the form of gel were used during root canal lubrication for easier penetration of an instrument in root canal preparation. In order to judge a quality of root canal lubricant it is essential to determine its physico–chemical properties.⁴ Several experimental studies have indicated that, number of generally available lubricants

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solution or gel is not effective in complete removal of soft and hard organic or inorganic materials at a time.⁵⁻¹⁰ The idea of study of physico-chemical properties came from surface tension of root canal irrigant in order to standardize the formulation.¹¹

2. Materials and methods

2.1. Materials

Materials required for the study of physico-chemical properties are purchased from Earth Chemicals, Mumbai made up of Merck Chemicals Pvt. Ltd.

2.2. Methods

The physico-chemical properties of various concentrations of self developed root canal lubricant gel includes appearance, Solid content, 5% aqueous solution pH, moisture content, viscosity and 5% aqueous solution stability in water etc.

Appearance of the gel observed physically by eyes. Solid content was determined by heating the gels in an electrical oven. 5% aqueous solution pH was determined using pH metre. Moisture content in the gel was found out using Karl Fischer's apparatus. Viscosity was analysed using B. F. Viscometer. The 5% aqueous solution stability is tested in cylinder.

2.2.1. Appearance

The appearance of formulation was observed visually with the help of naked eyes. The formulation is in the form of stable thixotropic gel. It has been observed that, viscosity of gel increases as concentration of active content of gel increases.

2.2.2. Solid content

In order to determine solid content a known quantity of gel was heated in an oven at 110 °C for 3 h or still constant weight is obtained. Exactly 1 g of sample of gel was heated at 110 °C for 3 h or till constant weight is obtained. The process of heating, cooling and weighing is continued till constant weight is obtained. Loss in weight was determined and from loss in weight, solid content was measured and listed in Table 1 and as shown in Fig. 1.

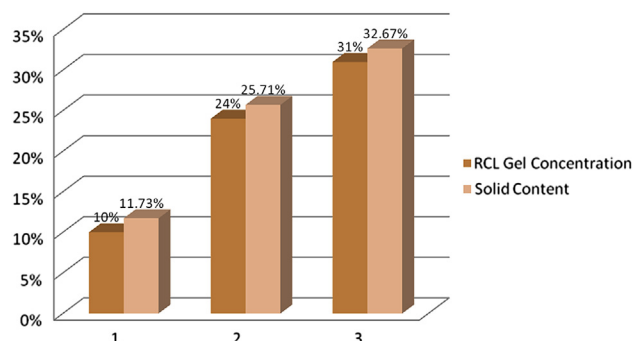


Fig. 1 – Solid content.

2.2.3. 5% aqueous solution pH

5% aqueous solution pH of the various concentration of gel was determined using digital pH metre having model no. CL – 280 made up of Labline Technologies Pvt. Ltd. Exactly 2 g self developed root canal lubricant gel was dissolved in 40 ml of distilled water and stored for 3 h. The measurements of pH of each formulation were carried out four times and their average values were recorded and listed in Table 1 and as shown in Fig. 2.

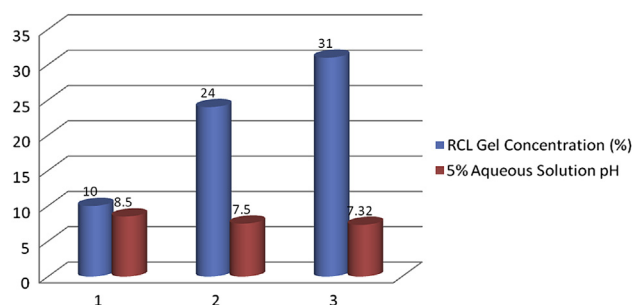


Fig. 2 – pH.

2.2.4. Moisture content

Moisture content in different concentration of self developed root canal lubricant gel was determined using Karl Fischer's apparatus. Exactly 0.4 g of gel sample was taken and water content was determined using Karl Fischer

Table 1 – Physico-chemical properties of 10%, 24% and 31% self developed root canal lubricant gel formulations.

Sr. no.	Properties	Self developed root canal lubricant gel		
		10%	24%	31%
1	Appearance	Clear, transparent, thick and stable gel	Clear, transparent, thick and stable gel	Clear, transparent, thick and stable gel
2	Solid Content [110 °C, 3 h]	11.73%	25.71%	32.67%
3	5% aqueous solution pH	8.5	7.5	7.32
4	Moisture content	88.25%	74.3%	67.3%
5	B. F. Viscosity [25 °C] in cP	3900	3600	3700
6	5% aqueous solution stability	Stable for 48 h at R. T.	Stable for 48 h at R. T.	Stable for 48 h at R. T.

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