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Endodontic

EVALUATION AND COMPARISON OF ABILITY OF VARIOUS ESSENTIAL OILS IN DISSOLVING GUTTA PERCHA: AN IN-VITRO STUDY.

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ABSTRACT **Introduction:**Gutta-percha is commonly used obturating material in permanent teeth and its removal is prerequisite for retreatment of endodontic therapy. This study was undertaken to compare essential oils in dissolving guttapercha. **Objectives:**To evaluate and compare dissolving ability of Symbophogonflexuosus, Melaleucaalternifolia, Eucalyptus globulusessential oils and RC solve in dissolving guttapercha. **Materials & Method** The guttapercha (F3) was preweighted and divided into 7 groups of 2 control group of RC solve and distilled water and 5 experimental group of tea tree, eucalyptus, lemongrass, basil and lavender essential oils. The samples were immersed for 2, 5 and 10 minutes and reweighted. The mean percentage of weight loss was determined for each guttapercha in each solvent at various time intervals. The data was statistically analysed. **Results:** RC solve had increased guttapercha dissolving ability followed by tea tree and lemongrass oils at 2, 5 and 10 minutes immersion time. Eucalyptus oil had least dissolving ability. **Conclusion:**Essential oils can be an effective alternative in dissolving guttapercha. Among the tested essential oils tea tree oil has shown better dissolving ability.

KEYWORDS : Guttapercha, essential oil, dissolving ability, tea tree oil, eucalyptus

Introduction:

The basic objective of nonsurgical endodontic retreatment is an attempt to re-establish healthy periapical tissues after inefficient treatment or reinfection of an obturated root canal system because of coronal or apical leakage. Access is required to the entire root canal system through removal of the defective root canal filling, further cleaning and shaping and reobturation.1Schilder introduced the term "retreatodontics" to indicate the branch of endodontics in charge of reprocessing an endodontic treatment in orthograde (conservative) or retrograde (surgical) way.2 The retreatment is indicated when clinical symptoms are present, when radiographic signs of failure are shown, when the tooth have to be included in a prosthetic restoration and endodontic treatment is incomplete even if clinical or radiographic signs are not present.3 A combination of methods are frequently preferred for meticulous cleaning of the canals. Aiming at the easy penetration of the instruments inside the filled root canal, the solvents are used because they allow the "softening" of filling material.[4]

The effectiveness of this procedure is guaranteed by the removal of the total amount of the sealer and the gutta-percha from an inadequately shaped and filled root canal system because it's critical for uncovering remnants of necrotic tissue or bacteria and they have to be exposed to a more efficient chemo-mechanical disinfection procedure.[3]

Commercially available GP solvents contains camphor, chloroform, d-limolene which are applied to dissolve guttapercha during retreatment.1 Ideal requirements are high solvent effect, low surface tension, low cytotoxicity, absence of carcinogenic effects, easy to use, quick action, long-life.[3]

Essential oils of orange and eucalyptus are used to dissolve endodontic sealers and guttapercha for retreatment. These are considered as safe, biocompatible, noncarcinogenic are considered useful for dissolving gutta percha.5 So, the aims of the present study is to evaluate and compare the dissolving ability of tea tree oil, lemongrass oil, eucalyptus oil, basil oil and lavender oil in dissolving guttapercha at 2, 5 and 10 minutes intervals with RC solve.

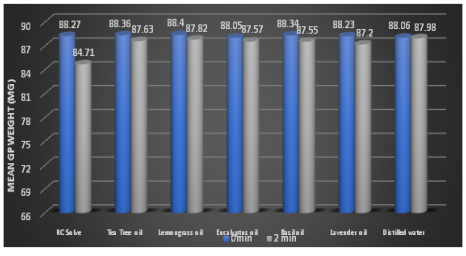
Materials and method:

The Guttapercha of size F2 was taken as a sample in the present study. Preweighted measurement of GP (F2) was taken by digital analytical scale. GP points were divided into 5 groups according to solvent (Experimental groups) that are tea tree, lemongrass, eucalyptus, basil and lavender essential oils and 2 control groups of RC solve and distilled water. GP points were immersed for 2, 5 and 10 minutes in a 2ml test tubes containing solvents. GP points were removed from the solvents and dried with ethanolic process and were measured in digital analytical scale after 2, 5 and 10 minutes. The mean percentage of weight loss was determined for each guttapercha in each solvent at various time intervals. The data was statistically analysed.

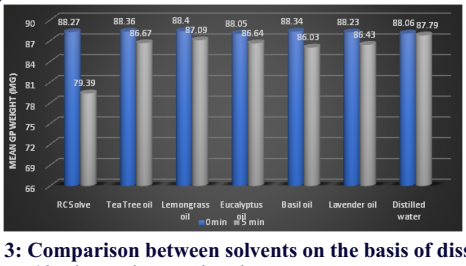
The statistical analysis was performed by using SPSS software.Mean weight of GP in milligrams was compared between the groups by using oneway ANOVA (intergroup comparison), Tukey's test (intragroup comparison). The comparison between different time intervals by using paired t-test and level of significance was set at 0.05.

RESULTS:

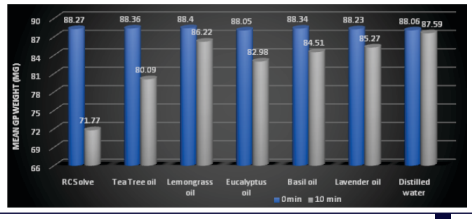
Graph 1: Comparison between solvents on the basis of dissolving efficacy at 2 minutes immersion time



Graph 2: Comparison between solvents on the basis of dissolving efficacy at 5 minutes immersion time



Graph 3: Comparison between solvents on the basis of dissolving efficacy at 10 minutes immersion time.



DISCUSSION:

The success of non-surgical endodontic retreatment is based on thorough cleaning of extensive root canal system without leaving any GP residues along with disinfection. The use of hand/rotary instruments with solvents are emphasized, because it decrease the risks of damaging to the tooth structure.3 The use of organic solvents are preferred, being more biocompatible and almost of no side effects.5 Essential oils are metabolic products of plants consisting of complex mixture of terpenic hydrocarbons which has been found to endow the essential oils with dissolving power for gutta percha.6 As, no literature search has been found for terpenic hydrocarbon containing essential oils as a solvent for guttapercha. Hence, this study is a small endeavour to assess the dissolving efficacy of essential oils containing terpenic hydrocarbons as guttapercha solvent.

Even the composition of EOs extracted from the plants of same species differ in different geographic locations. Composition also depends on the maturity of the plant from which the EOs are extracted.6 In the present study, in relation to the time period, no statistically significant difference was found at 2 and 5 minutes interval, even with the weight loss by essential oils. At these time intervals, RC Solve exhibited statistically significant & better dissolving power as compared to all the essential oils in dissolving GP. RC solve is a commercially available GP solvent containing extracts of orange oil.7 Similar results were obtained by Limongiet al. (2003)7 and Scelzaet al. (2008)8 with similar capacity of orange oil for cleanness of the filling material from the root canals.

Tea tree oil had shown the best dissolving ability among the other essential oils at 10 minutes interval significantly. It is a terpenic hydrocarbon. The strong dissolving power can be attributed to terpinen-4-ol, an active functional group.6In the present study, eucalyptus oil showed less solubility than tea tree oil but was found to be significantly better than other essential oils. The main component is 1,8-cineole and terpinene-4-ol, a favourable chemical structure & can be an alternative in cases of retreatment.6 Similar results were obtained by Dagnaet al. (2017)3 and de Oliveriaet al. (2017)5 where Eucalyptus oil had lower dissolving ability than RC solve.

In the present study, basil oil showed less dissolving action than tea tree and eucalyptus oils. Basil oil is obtained from sweet basil plant extract and contains terpenes.6If used properly, they may prove very useful in retreatment of failed endodontictherapy. In particular, clinical trials that confirm the therapeutic potential of EOs in vivo and address issues such as adverse effects, toxicity, and their interaction with other drug molecules would be of great value.

Even the composition of EOs extracted from the plants of same species differ in different geographic locations. Composition also depends on the maturity of the plant from which the EOs are extracted.6Lavender oil showed less solubility than other essential oils but was better than lemongrass oil, in the present study. It is obtained from the flowers of Lavandulaangustifolia. Major components found are linalool, linalyl acetate, terpinen-4-ol, camphor.6Lemongrass oil showed minimum dissolving ability than other essential oils. Lemongrass oil (LGO) is extracted from fresh leaves of Cymbopogoncitratus and contains traces of favourable chemical limonene and citral for its solvent action.[9]

Within the limitations of the present study, tea tree oil can be a better alternative for softening and removal of guttapercha for retreatment of failed endodontic therapy amongst the tested essential oils.

CONCLUSIONS:

Tea tree oil can be a better alternative for softening and removal of guttapercha for retreatment of failed endodontic therapy amongst the tested essential oils. EOs have potential to be developed as preventive or therapeutic agents. Although several other potential uses of Eos have been described and many claims of therapeutic efficacy have been validated adequately by either in vitro testing or in vivo clinical trials, still there is need for conducting further research to establish the safety and efficacy of these EOs before including them in clinical practice.

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