Original Article

Comparative Evaluation of Effect of Different Varnishes (MI Varnish, Clinpro Varnish and Fluor Protector Varnish) on Candida albicans Count and Salivary pH in Children aged 6-12 years – A Randomized Control Trial

Dr. Ramya JR[1], Dr. Nidhi Gupta, Dr. Natasha Gambhir*, Dr. Rashi Singh[4], Dr.Neeti Mittal[5], Dr. Divya Singh[6]

[1]Post Graduate Student,Department of Pediatric & Preventive Dentistry, Santosh Dental College and Hospital, Ghaziabad, Uttar Pradesh, India
[2]Professor and Head of the Department Department of Pediatric & Preventive Dentistry, Santosh Dental College and Hospital, Ghaziabad, Uttar Pradesh, India
[3*]Professor,Department of Pediatric & Preventive Dentistry, Santosh Dental College and Hospital, Ghaziabad, Uttar Pradesh, India
[4]Reader, Department of Pediatric & Preventive Dentistry, Santosh Dental College and Hospital, Ghaziabad, Uttar Pradesh, India
[5]Reader, Department of Pediatric & Preventive Dentistry, Santosh Dental College and Hospital, Ghaziabad, Uttar Pradesh, India
[6]Senior Lecturer, Department of Pediatric & Preventive Dentistry, Santosh Dental College and Hospital, Ghaziabad, Uttar Pradesh, India
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Abstract

PURPOSE: Candida albicans one of the commensal organisms in the oral cavity, causes fermentation of the dietary carbohydrates leading to the formation of organic acids, which contributes to the development of dental caries. The aim of the study was to evaluate and compare the efficacy of 3 different fluoride varnishes against Candida albicans in the prevention of dental caries before and immediately after fluoride varnish application and also over a period of 1 week, 1 month and 3 months. **METHODOLOGY:** A sample size of 60 children's aged between 6-12 years were randomly selected by block randomization and divided into 3 groups: Group 1 MI Varnish, Group 2 Clinpro XT varnish and Group 3 Flour Protector varnish. Unstimulated saliva samples were collected before and after the application of fluoride varnishes (collected immediately after application, after 1 week, 1 month and 3 months) and were sent for microbiological analysis. The pH of the samples were evaluated by Indikrom paper strips. The results obtained were statistically analysed by mean, standard deviation and One way ANOVA. **RESULTS:** MI varnish showed a significant drop in Candida albicans followed by Clinpro XT varnish and Fluor Protector Varnish whereas no significant difference were seen in pH. **CONCLUSION:** The results of the study shows that MI Varnish, Clinpro XT Varnish and Fluor Protector Varnish have antifungal effect on Candida albicans. MI Varnish showed its more profound effect.

Keywords: MI Varnish, Clinpro XT Varnish, Fluor Protector Varnish, Fluoride Varnish, Candida albicans, Salivary pH

INTRODUCTION

Oral cavity is dominated by cariogenic bacterial and fungal species like Candida albicans [(1).] Candida albicans (non-specific plaque hypothesis) causes fermentation of the dietary carbohydrates leading to the formation of organic acids which causes a decrease in pH leading to dissolution of the inorganic contents of the tooth[(2)] and thereby contributing to the development of carious tooth [(3)] Various approaches have been introduced to reduce the occurrence of dental caries.[(2)] Fluoride varnish which is immune to dental caries was first reported back in in Europe in 1964. [(4)] Flour protector, originally developed by Arends and Schuthof in 1975 with a fluoride concentration of 0.7 % Ethyl acetate, Difluorosilane (0.9 %)- active ingredient, contains 7,700 ppm at application. It shows low viscosity which helps to gain access to proximal surface and a twice yearly application is sufficient. [(5)] Clinpro XT Varnish (3M ESPE) is a light cure, two parts liquid/paste system with a paste containing radio opaque Fluoroaluminosilicate glass, and liquid of modified polyalkenoic acid. [(10)] Clinpro XT varnish contributes for the chemical adhesion between the Clinpro varnish and tooth surface [(6)] MI Varnish with CPP-ACP (GC: Tokyo Japan) is a more stable and durable fluoride varnish. [(7)] It contains 5 % NaF enhanced with 2 % CPP-ACP,

with a fluoride concentration of 22,600 µg F/g.[8][9]. Studies have been conducted to rule out the effect of varnishes on Streptococcus mutans but to the best of my knowledge, none has been done till date, to evaluate the effectiveness of varnishes on Candida albicans count in saliva of children.

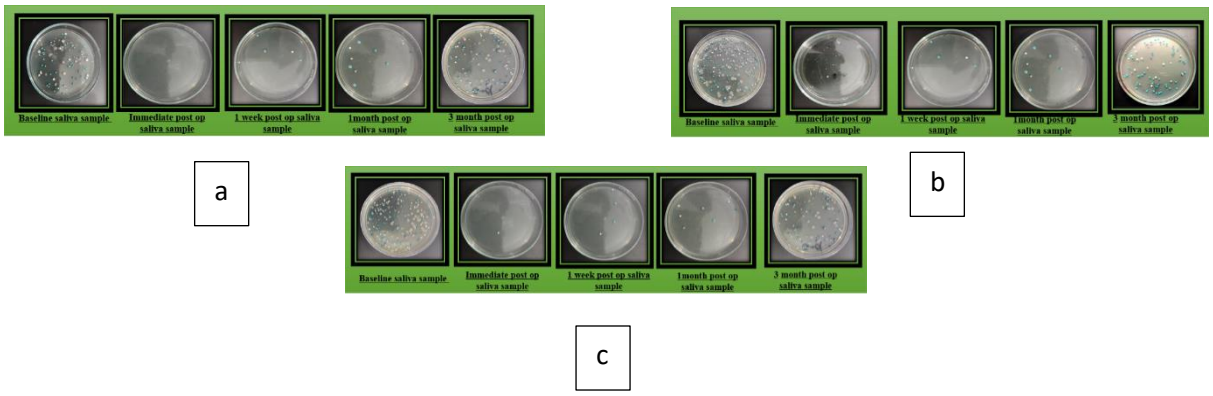
Aims and objectives

The study was conducted with the aim to evaluate and compare the efficacy of 3 different fluoride varnishes against Candida albicans in the prevention of dental caries over a period of 3 months

Materials And Methods

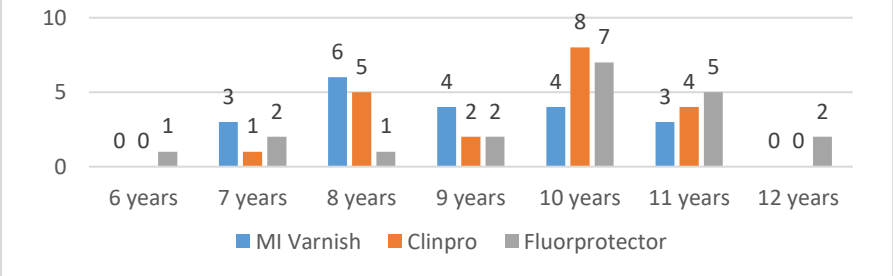
The study was conducted on 60 caries free children, selected from the Dental Camps organized in School and were referred to the OPD of the Department of Pediatric and Preventive Dentistry, Santosh Dental College and Hospital, Ghaziabad. Children with healthy oral hygiene and fully erupted permanent molars on the maxillary and mandibular arch aged 6 to 13 were included. Children with existing carious teeth and gingival inflammation, with partially erupted molar, with systemic diseases such as Type 1 Diabetes, and with the fluoride treatment history within 6 months were excluded. The subjects were asked not to eat or brush, 1 hour prior to sample collection. 2 ml of baseline unstimulated saliva was collected by drool out method. The unstimulated salivary pH was estimated by placing the pH strips (Indikrom pH strips) for 10 seconds into the collected saliva sample. The rest 1ml of unstimulated saliva collected were sent to the microbiological laboratory on the same day for the analysis of Candida albicans count. In the laboratory the samples were inoculated into HiCrome Candida Differential agar culture plates and incubated at 37 °C for 48 hrs. Candida albicans appearing as light green coloured smooth colonies were counted using a manual colony counter. After baseline sample collection, the tooth was then isolated using a cotton roll and high-volume saliva ejector. The material was applied according to the group allotted, on the permanent molars as: **MI Varnish – GC – Group 1** ; **Clinpro XT Varnish- 3M ESPE– Group 2** and **Fluor Protector Varnish – Ivoclar Vivadent– Group 3**. The subjects were refrained from eating, drinking and oral hygiene procedures for 1 hour. The post treatment saliva samples collected, immediately after the completion of the treatment, after 1 week, 1 month, 3 months were also analysed for both Salivary pH and Candida albicans count **(Figure 1- a,b,c).**

Fig 1: Saliva sample culture plate - hi chrome agar for Candida albicans CFU/ml count – a) MI Varnish, b) Clinpro XT Varnish, c) Fluor Protector Varnish



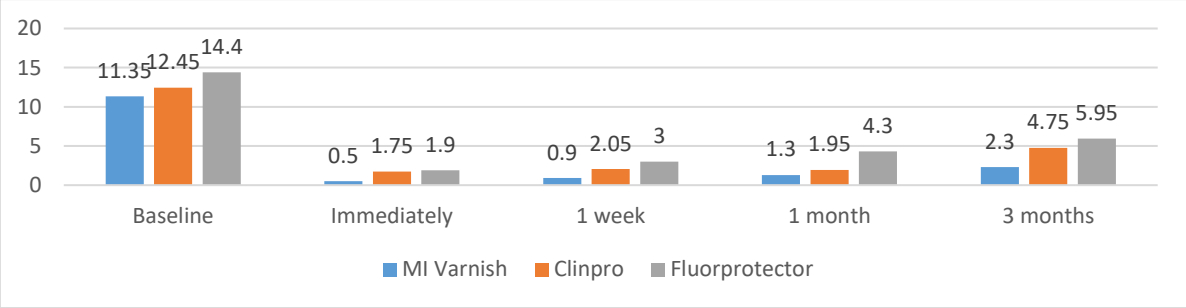
Results

Among the 60 children participated in the study higher percentage of children were in the age group of 9.37±1.44 years (Table 1). The study's research power was calculated to be 80%, with a 95% Confidence Interval (CI).

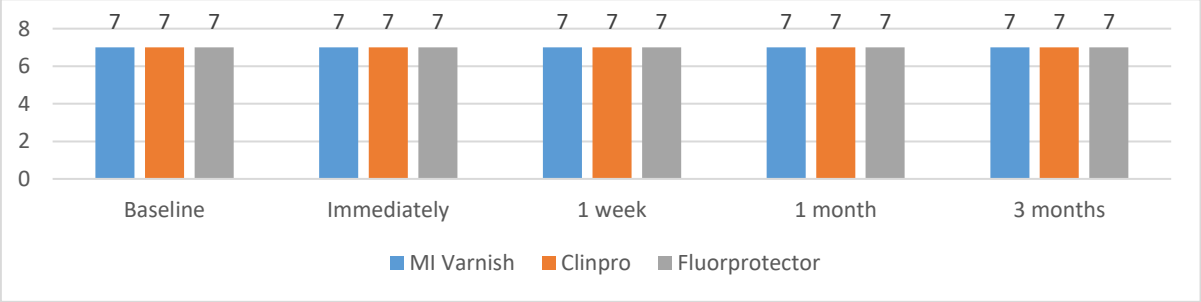


Graph 1: Population distribution by age

The mean and standard deviation of MI Varnish, Clinpro XT Varnish and Fluor Protector Varnish on Candida albicans count and pH recorded at different intervals (before application of the varnish, immediately after the application, 1 week, 1 month and 3 months after the application of the varnish) respectively in Table 2 and 3. Though candida albicans count decreased in the 3 groups from baseline to 3 months, the magnitude of the decrease in Candida albicans count, had a more profound effect on the cultures immediately after testing and after 1 week, as compared to 3 months after application. The mean salivary pH did not show any statistical difference till 3 months follow up. The results were statistically analysed by One Way ANOVA



Graph 2: Comparison of mean candida albicans count among the three varnish groups
One way ANOVA applied, p-value significant at p≤0.05



Graph 3: Comparison of mean salivary pH count among the three varnish groups
One way ANOVA applied, p-value significant at p≤0.05

Discussion

Fluorides have been used as a remineralising agent in dentistry for the past few decades because of its capability to protect the tooth against caries. [2] Topical fluoride application are considered to be economical, quick and easy to apply. [3]

In this study, 3 fluoride varnishes- Clinpro Varnish, MI Varnish and Fluor Protector Varnishes were used to assess the reduction in Candida albicans count and pH in the saliva of caries free children. These varnishes used in the study differs in its composition and the amount of fluoride concentration. The present study was done using a simplified chair-side draining method of collection of unstimulated saliva. [10] Clinpro XT Varnish were found to be effective in decreasing the Candida albicans count thus reducing the incidence of decayed tooth and this was in agreement with study conducted by Pitchika V et al, 2013. [15] The most profound effect of Fluor protector Varnish showed a remarkable decline in Candida albicans count in a period of 24 hours thus decreasing the incidence of dental caries. This was seen in compliance with the study by Deepti A et al, 2008. [16] MI varnish containing CPP-ACP is a more stable and durable varnish and was found to be more effective in the reduction of Candida albicans count when compared with other fluoride varnishes Clinpro XT varnish, Fluor protector varnish, which was seen in compliance with the study conducted by Vinola Duraisamy et al (2015) [17] and Shweta Chandak et al (2016). [18] According to Salman et al (2019) [19] and Ankita Maurya et al (2020) [20] fluoride varnish containing CPP-ACP were found to have an increased acid resistance thus preventing the incidence of dental caries. This was in agreement with the current study. The salivary pH in the saliva of the children was determined according to Kuriakose S et al (2013) using Indikrom pH strips, as pH is an main risk factor for the development of dental caries [21] According to Kameshwaran Muralikrishnan et al (2018). [22] The current study compared the effectiveness of Varnishes in the reduction of the Candida albicans count and changes in pH before and after application of Varnishes. It should also be noted that the effect of fluoride varnishes lasts for a specific period of time as it is a surface acting agent which shows its effect when in contact the susceptible tooth surface, inorder to prevent the incidence of dental caries.[23] The observation from this existing study provides an insight into the

usage of these preventive fluoride varnishes as an important and easily accessible caries-preventive agent against Candida albicans. However, the antimicrobial efficacy of these Fluoride varnishes against wider range of bacteria and Fungi are recommended.

Conclusion

The findings of our study, concluded that stabilizing the oral environment by preventive procedures like application of Fluoride Varnishes reduces the Candida albicans counts. Thus reducing the risk of incidence of dental caries. Among the topical fluoride varnishes evaluated it was found that MI Varnish showed a greater antifungal efficacy followed by Clinpro XT Varnish and Fluor Protector. No statistically difference in pH was also recorded.

CLINICAL SIGNIFICANCE OF THE STUDY

The present study is a milestone study which determines the antifungal efficacy of Fluoride varnishes. The current study unmasks the importance of Candida albicans count in the prevention of Dental caries incidence. MI Varnish containing CPP-ACP was found to effective against both bacterial as well as fungal species over a follow-up period of 3 months.

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