COMPARISON ON FLUORIDE CONCENTRATION IN FLUORIDE VARNISH AND GLASSIONOMER CEMENT

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Keywords:

Fluoride varnish; Glass ionomer cement; Fluor; Saliva.

ABSTRACT

Background: Caries is one of the most common dental diseases. Caries prevention by improving dental health has become a major goal in the world of dentistry.Topical application of fluoride is one of the most effective ways to prevent caries.Glass ionomer cement and fluoride varnish has the effect of preventing dental caries because these materials release fluoride. There is no better treatment for demineralization than prevention itself. One of these steps is the combination of dental restorative materials with the application of topical fluoride as an additional source of fluoride.
Method: A total of 32 permanent premolar teeth samples, immersed in artificial saliva before and after the application of fluoride varnish and glass ionomer cement. The measurement of fluoride levels in saliva was carried out using a spectrophotometric tool.
Result: Independent T-test results obtained sig. below 0.05 indicates that there are differences in the level of fluoride levels between the fluoride varnish group and the glass ionomer cement.
Conclusion: Fluoride varnish and glass ionomer cement can increase fluor concentration in saliva.

INTRODUCTION

Dental caries is one of the most common dental hard tissue infections in all levels of society from various economic groups and ages.[1] The highest prevalence of dental caries cases according to WHO is in Asia and America. According tobasic health research(Riskesdas), there was an increase in the prevalence rate of caries in the Indonesian population, From the health survey results showed in 2007 the number of dental active caries is 43.4% and increased to 53.2% in 2013, the results of Riskesdas in 2018 showed that the dental health conditions of the Indonesian people tended to be not good.[2]

Dental caries is defined as a microbiological disease of dental hard tissue characterized by demineralization of inorganic substances and destruction of organic substances that can cause pain. The increase in caries prevalence is generally influenced by two factors, risk factors and modification factors. The factors that directly cause caries are identified as risk factors. Risk factors consist of oral hygiene, bacteria, saliva, vulnerable tooth surfaces and diet. Modification factors are factors that indirectly cause caries, but affect the development of caries. These factors are age, heredity, gender, social and geographical factors.[1,3]

Improving dental health is the main goal in dentistry to prevent dental caries. Efforts to control plaque and dental caries can be done in two ways, namely by mechanical and chemical processes.

The mechanical approach is to use a toothbrush and toothpaste, while the chemical method is to use anti-cariogenic chemicals. Topical fluoride application is one of the most effective ways to prevent caries, fluoride compounds work to inhibit the absorption of salivary protein on the enamel surface, thus inhibiting pellicle and plaque formation, and increasing resistance from enamel remineralization to acids and lowering pH, so that fluoride has an antimicrobial effect or can prevent caries.[4,5]

Fluoride varnish was developed in 1960 with the aim of extending the adhesion time of fluorideto the tooth surface, inhibiting demineralization of enamel. fluoride in the form of varnish has a coating of pellicle proteins and secondary phosphates. when the pH is low, it will release fluoride ions and absorbed it to the surface of the enamel to increase the rate of remineralization. The realeased ion are fluorpatite that provides additional protection to the enamel surface, thus preventing dental caries.[6,7,8]

Glass ionomer cement (GIC) has the effect of preventing dental caries because these materials released fluoride. GICcontains 10 to 23% fluoride. First24 hours after the powder and liquid are mixed fluoride release show its peak. After this, rate of fluoride releasedecreases over weeks and finally it stabilizes at a constantlevel in 3 to 4 months. Glass ionomer cement can significantly reduce enamel demineralization compared to conventional resins, along with fluoride and calcium phosphate applications. Fluoride has the ability to react with the enamel surface to form calcium fluoride and fluorapatite, thus making the enamel surface more resistant to demineralization. Fluoride reacts by forming calcium fluoride and fluorapatite to increase enamel mineralization and make enamel more resistant to acids. There is no better treatment for demineralization than its own prevention. One of these steps is to combine dental restoration materials with the application of fluoride as an additional source of fluoride.[9,10]

There are many ways to prevent dental caries, including preventive measures by topical application of fluoride to the tooth surface. However, the difference in the effect of these actions on fluoride levels in saliva is not yet known. Based on the description above, the researcher is interested in knowing the comparison of the effect of fluoride varnish with glass ionomer cement on fluoride levels in saliva.

MATERIALS AND METHODS

This type of research is a laboratory experimental study with a cross sectional approach with a pre and post test research design. This research was conducted in the Dental Conservation Laboratory of the Faculty of Dentistry, Prof. DR. Moestopo (Beragama) then continued with laboratory analysis. The research was carried out in July-August 2019.

The inclusion criteria in the sample of this study were 32 permanent premolar teeth that had been removed with an intact crown and fully formed roots, without caries, and without fillings. The tools used in this study were: (1) Masks and gloves, (2) Saliva containers, (3) Bristle Brush, (4) Spatle cement, (5) Spectrophotometric. The materials used in this study were: (1) Fluoride varnish (Ftor-lux fluoride varnish), (2) Glass ionomer cement(GC Fuji VII), (3) Artificial saliva.

The application of the GIC in this research contain 3% Casein phosphopeptide-amorphous calcium phosphate (CPP-ACP)-modified GIC (GC Fuji VII) meanwhile Ftor-lux fluoride varnish contain 1% Sodium fluoride, 4% Calcium fluoride, Amine fluoride 0,5%. The researchprocedure began by preparing the sample 32 permanent premolar teeth that match the criteria, then the samplepermanent

premolar teeth is being cleaned with a running water and wait until the sample teeth dry. After that the sample teeth was immersed in artificial saliva, Sampling of saliva before application of the glass ionomer cement and fluoride varnish was carried out to obtain a pre-test sample, then applied fluoride varnish and glass ionomer cement to the sample teeth then immersed back into artificial saliva and wait 30 minutes before sampling of saliva after application of the glass ionomer cement and fluoride varnish to obtain a post test sample. All saliva samples are then taken to the laboratory for procedures for measuring fluoride levels in saliva.

Analysis is performed to explain or describe data using tables and graphics. Bivariate analysis to explain the relationship between two variables, The independent and dependent variables, was tested for normality using the Saphiro Wilk test. If the significance is below 0.05, the data is not normal, if the significance is above 0.05, the data is normal. If the data distribution is normal, a Paired T-test is performed to test before and after the application of glass ionomer cement and fluoride varnish. For the test between groups of glass ionomer cement and fluoride varnish, an Independent T-test was carried out, if the data distribution was not normal, the Wilcoxon test was performed to see the difference between before and after treatment and the difference between the 2 groups. Data analysis was performed using a computer program.

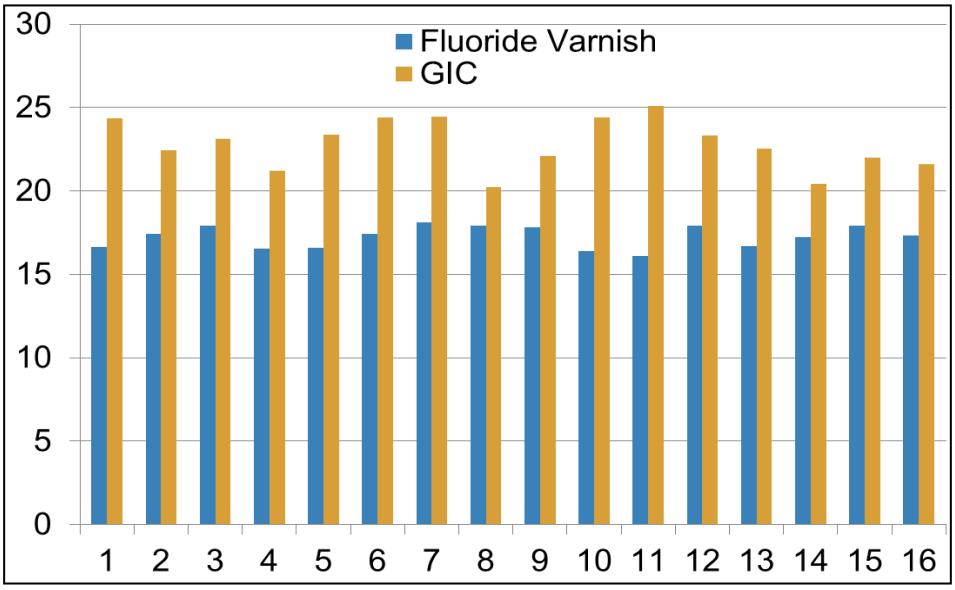
RESULTS

Research has been carried out on the comparison of the effect of fluoride varnish and glass ionomer cement on fluoride levels in saliva. The study was conducted for 8 days, from 29 July 2019 to 6 August 2019 with 32 samples of upper first premolars according to the inclusion criteria. The type of research used was a laboratory experimental study with a cross sectional approach with a pre and post test design.

There are 2 groups, Group 1 is the group that takes measurements of fluoride levels in saliva after fluoride varnish application and Group 2 is the group that takes measurements of fluoride levels in saliva after glass ionomer cement application which is measured using a UV-Vis Spectrophotometric instrument. Data processing is done using a computer program. The result showed that there was an increased in the value of fluoride levels in saliva after application of both group.

The data distribution in this study was performed using the normality test Shapiro-Wilk test because this test is effective and valid for small samples (<50 samples). The normality test was perfomed and shows that the Shapiro-Wilk significance value is above 0.05, it can be concluded that the data is normally distributed. The Paired T-test was performed to test before and after the application of glass ionomer cement and fluoride varnish. The average fluoride level before fluoride varnish has a fluoride level of 15.1688, while the average fluoride level after fluoride varnish has a higher fluoride level of 17.2456. The Paired T-test of glass ionomer group shows that the fluoride level before the glass ionomer cement has a fluoride level of 15.1019, and increased after glass ionomer cement application to the level of 22.8175. For the test between groups of glass ionomer cement and fluoride varnish, an Independent T-test was carried out to see the diference between the two groups. The research results can be seen in the table as follows:

Table I. The average fluoride levels in the glass ionomer cement group had a higher level of fluoride concentration than the fluoride levels in the fluoride varnish groups.



DISCUSSION

This study was conducted to see the difference in the effect of fluoride varnish and glass ionomer cement on fluor concentration in saliva. The effect of fluoride varnish and glass ionomer cement applications on fluor concentration in saliva can be seen by observing changes in fluoride levels as measured by calculating the increase in fluoride levels in saliva after the application of fluoride varnish and glass ionomer cement. In this study, the colorimetric method with a spectrophotometer after the addition of SPADNS-reagent zirconyl acid was usedto determine the fluoride level in saliva.

The difference in fluor concentration in saliva is known by looking at the color changes that occur in saliva. This color change occurs because of the reaction that occurs between the reagent and the fluoride levels in the saliva. The purpose of this study was to obtain optimum and valid conditions for the analysis of fluoride ions using spectrophotometry with SPADNS reagent and to determine the content of fluoride ions contained in saliva samples using spectrophotometry with SPADNS reagent.

Since 1980 it has been known that fluoride controls caries which increased enamel resistance to caries, remineralization of incipient caries, interferencewith micro-organisms and improved tooth morphology.Enamel is dissolved by lowering of pH in dental plaque dueto acid production. When the pH is lower than thecritical pH, hydroxyapatite (HA) is dissolved and at the sametime, fluorapatite is formed. This indirect effect of fluoridein reducing enamel demineralization when the pH drop iscomplemented by its natural effect on remineralization.[9]

Fluorides acts as reservoirafter application of a fluoride treatment such as toothpaste,varnish or restorative material and is then released into thesaliva over time.Presence of fluoride enhances the uptake of calciumand phosphate ions and makes the tooth more resistant todemineralization. It has been shown in many studies thata noncavitated lesion can be made reversible. But oncecavitation occurs, caries removal and restoration is indicated.[9]

The presence of fluoride in saliva in normal amounts can be useful for dental care, for example, to prevent dental caries. Fluoride varnish is proven effective for the prevention of dental caries in children and adolescents. It adheres to the

surface of enamel and prolongs the time of fluoride contact to the tooth surface, improving the uptake of fluoride. The concentration of fluoride in saliva depends on the amount of fluoride consumed. WHO research reports that the presence of fluoride can bebeneficial if the concentration in drinking water is in the range 0.8-1.0 mg / ml.[11,12]

The results shows that fluoride varnish and glass ionomer cement are proven to increase fluoride levels in saliva. The results of this study are consistent with the results of research by Oliveira DCD, et al., Who stated that there were significant differences in fluoride levels in saliva before and after the application of fluoride varnish and glass ionomercement. There is a significant difference between the fluoride varnish and glass ionomer cement groups, with the fluoride content in the glass ionomer cement group being higher. The results of this study are also in accordance with the results of research by Trairatvorakul C, et al, who stated that there was a significant increase in fluoride levels after the application of fluoride varnish and glass ionomer cement, with the level of fluoride release in glass ionomer cement being 10-30% higher than fluoride varnish.[13,14]

CONCLUSION

Based on the results of the discussion in this research, it can be concluded that:

1. There is a significant difference in the mean value of fluoride levels in saliva before and after the application of fluoride varnish and glass ionomer cement.
2. There was a significant difference in fluoride levels in saliva between the fluoride varnish and glass ionomer cement groups, with the average value of the glass ionomer cement group being higher than the fluoride varnish group.
3. Application of fluoride varnish and glass ionomer cement can increase the level of fluorine in saliva.

ACKNOWLEDGEMENT

This work was supported by Department of Conservative, Faculty of dentistry, Prof.Dr.Moestopo (beragama) university.

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