



Comparison between the effect of commercially available chemical teeth whitening paste and teeth whitening paste containing bromelain on human enamel

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Abstract

Aim: To compare the effects of commercially available chemical teeth whitening paste and teeth whitening paste containing bromelain on human enamel.

Materials and methods: 12 samples were collected for the study and grouped into two. The toothpaste was used on the samples and the effect on enamel was checked using Vita easy shade spectrophotometer. Data was collected, tabulated and statistical analysis was done using SPSS v26.

Results: Enamel shades were increased in 5 samples when it is treated with commercially available chemical teeth whitening paste and increased in 3 samples when treated with teeth whitening paste containing bromelain. p value is 0.351 ($p > 0.05$) which is statistically insignificant.

Conclusion: From the results, it is seen that the commercially available teeth whitening toothpaste has more effect on enamel than the toothpaste containing bromelain.

Keywords: Toothpaste, Bromelain, Enamel, Shade, Effect

Introduction

The hardest substance in the human body is enamel, which also has the largest concentration of minerals (at 96%), the rest of which is made up of water and organic stuff(1). The main component is the crystalline calcium phosphate mineral hydroxyapatite(2). Before a tooth erupts into the mouth, enamel is produced on it while it grows within the jaw bone(3). Enamel is not constituted of cells and does not include blood vessels or nerves once it has fully developed(4). Up to a point, tooth

damage can be repaired by remineralization, but damage beyond that cannot be fixed by the body. One of dentistry's core priorities is the care and repair of human tooth enamel. Enamel often ranges in colour from pale yellow to grayish (bluish) white(5).

According to some theories, the translucency of the enamel has a role in tooth colour, with grayish teeth having a more opaque enamel and yellowish teeth having a thin, translucent enamel that allows the yellow hue of the dentin to show

through(6). Variations in the degree of calcification and uniformity of the enamel may be responsible for the translucency. On the upper incisors, the colour occasionally has a slight blue or translucent off-white tone at the edges of teeth where there is no dentin under the enamel(7). Due to the semi translucent nature of enamel, a tooth's appearance is greatly influenced by the colour of the dentin and any other materials underneath. Exposure to chemicals like tobacco, coffee, and tea can cause teeth to yellow over time(8). The interior interprismatic portion of the enamel becomes stained, making the tooth overall look darker or more yellow.

Although enamel is colourless in its ideal form, due to the low light reflection qualities of teeth, it does reflect the underlying tooth structure with its stains. To clean and polish natural teeth, dentifrices like tooth powder and toothpaste are used in conjunction with a toothbrush(9). They can be ordered in the form of paste, powder, gel, or liquid. Over the years, many dentifrices have been created, some focusing on marketing tactics to sell items, including providing whitening qualities(10). The toothpaste that is used in conjunction with a toothbrush to assist remove food particles and dental plaque is the most important dentifrice that dentists advise using. The French word for toothpaste is dentifrice(11). To maintain oral hygiene, toothpaste is a dentifrice used along with a toothbrush. An abrasive, binder, surfactant, and humectant are required ingredients(12). There are more substances used. The paste's primary function is to remove dirt and plaque, while some varieties are also promoted for secondary purposes like breath refreshing and tooth whitening(13) Our team has extensive knowledge and research

experience that has translate into high quality publications (14–23)

Materials and methods

In this in vitro study, teeth extracted for orthodontics purposes were collected safely. Totally 16 natural tooth samples were collected and 8 samples each for 2 groups. Group-I teeth were treated with Colgate Optic white- Whitening toothpaste and Group-II teeth were treated with R.O.C.S. Toothpaste - Mineralin Complex with Calcium Bromelain. The collected samples teeth shade was determined using Vita easy shade spectrophotometer before the procedure. The samples were brushed with the soft bristles toothbrush with their respective toothpaste daily for 1 min in a circular motion. The samples were stored in a distilled water container separately throughout the study period. This procedure was carried out for 14 days and at the end of the 14th day the teeth were checked again for shade using Vita easy shade spectrophotometer. The results were obtained and the values were tabulated, with the tabulated values statistical analysis such as “t test” was performed using SPSS v22

Ingredients of Colgate Optic white-Whitening toothpaste:

Propylene Glycol, Calcium Pyrophosphate, PEG/PPG-116/66 Copolymer, PEG-12, Glycerin, PVP, Silica, Flavour, Tetrasodium Pyrophosphate, Sodium Lauryl Sulfate, Hydrogen Peroxide, Disodium Pyrophosphate, Sodium Monofluorophosphate, Sodium Saccharin, Sucralose, BHT.

Ingredients of R.O.C.S. Toothpaste - Mineralin Complex with Calcium Bromelain:

the natural proteolytic enzyme bromelain, xylitol, calcium glycerophosphate and magnesium chloride.

Results

Sample	Group-I		Group-II	
	Pre	Post	Pre	Post
1	2R-2	2R-2	3M-3	3M-2
2	2M-3	2M-2	2R-1.5	2R-1.5
3	1M-3	1M-2	2M-2	2M-2
4	2L-1.5	2L-1.5	3M-3	3M-2
5	2R-3	2R-2	2R-3	2R-3
6	2M-3	2M-3	0L-2.5	0L-2.5
7	0R-3	0R-2	3L-2	3L-2
8	2M-2	2M-1	2M-2	2M-1

Table 1: Table showing the pre enamel shade and post enamel shades after being treated with the chemical teeth whitening

paste and teeth whitening paste containing bromelain.

	Mean	SD	p Value
Group-I	0.625	0.518	0.351
Group-II	0.375	0.518	

Table 2: Table showing the paired t-test for comparison shade of enamel ($p < 0.05$, statistically insignificant)

Discussion

Dentistry is essential in defining a person's aesthetics and raising one's sense of self-worth. The most common dental procedure is tooth whitening, which involves both surface and deep stain removal. Teeth whitening can be done professionally with the application of chemicals or at home with a variety of solutions(24). The most widely used product is teeth whitening paste, which is convenient to use and

widely accessible. Recently, commercially available tooth paste for teeth whitening has replaced chemicals with natural ingredients or their derivatives. In this study, from all the samples collected, the enamel shades were increased in 5 samples when treated with chemical teeth whitening paste and enamel shades were increased in 3 samples when it was treated with teeth whitening paste containing bromelain. Eventhough it is statistically insignificant, the mean value is higher in the chemical teeth whitening toothpaste. Previous studies by kalliath etal, states that, While the surface irregularities on the surface of the enamel were increased

with chemical whitening toothpaste when compared to toothpaste containing ingredients of herbal origin, the chemical whitening toothpaste demonstrated better teeth whitening than toothpaste containing ingredient of herbal origin(25).

Other studies The test group's mean post-treatment luminance was discovered to be substantially higher than that of the control group(26). The test group's average stain removal rate was noticeably higher than that of the control group. When compared to the control, the test dentifrice significantly removed stains, which can be attributed to the inclusion of proteolytic enzymes in the test dentifrice(27). One-way Three groups of enamel did not differ significantly according to an ANOVA, although composite groups did (p 0.01). While Z-250 composite resin's microhardness value decreased, enamel hardness was unaffected by Crest and Aquafresh whitening toothpastes(28). The microhardness was lessened more by Crest than by Aquafresh. Although different forms of hydrogen peroxide are typically used to whiten teeth, whitening toothpastes also include particular abrasives and/or chemical ingredients in their formulation(29). In this method, teeth whitening is reliant on extrinsic stains being eliminated in addition to peroxides being delivered from the toothpaste to the dental structures(30).

Conclusion

Based on the findings in this study, the effectiveness of the commercially available chemical teeth whitening toothpastes on the enamel is higher than the teeth whitening paste containing bromelain. The enamel shades increased when compared to the other toothpaste.

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