RECENT ADVANCES ON CONCEPTS OF TOOTH WHITENING - A REVIEW

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***Abstract*: An increasing number of oral care products focus on teeth whitening. The aim of this review is to summarize and discuss frequently used whitening agents and their efficacy from a chemical viewpoint. This study is undertaken to discuss the comprehensive literature survey on teeth whitening agents and products was conducted. Frequently used whitening agents are abrasives, antiredeposition agents, colorants, proteases, peroxides, and surfactants. In this modern world, people are increasingly becoming conscious about how they look. They do not mind spending a considerable sum to make themselves look good. This has led to an increased demand for clinical cosmetologists. The course of cosmetology will help you in gaining extensive knowledge and expertise to become experts in cosmetology treatments. When manufacturer's instructions are followed, hydrogen peroxide and carbamide peroxide based tooth whitening is safe and effective. Patients should be informed of the risks associated with tooth whitening and instructed on identification of adverse occurrences so that they may seek professional help as needed.**

***Keywords*: Whitening, peroxide, cosmetology, Aesthetics, Abrasives.**

INTRODUCTION:

The aim of modern oral care products is to prevent caries and periodontitis. Caries and periodontitis can be prevented mainly by tooth brushing with a manual or electric toothbrush in combination with toothpaste as well as a healthy diet and lifestyle. Modern toothpastes are highly complex formulations which contain many different agents for the prevention of caries and periodontitis, e.g., fluorides, chlorhexidine, stannous, zinc salts and calcium phosphates such as hydroxyapatite or amorphous calcium phosphates, and surfactants as well as different abrasives.(1)

Besides prevention of caries and periodontitis, an increasing number of oral care products focus on teeth whitening. In addition to that, an increasing number of oral care products also focus on teeth whitening. This is due to cosmetic reasons, because many people prefer white teeth and a bright smile as it may also affect their quality of life.The aim of this review is to summarize and discuss frequently used whitening agents and their efficacy from a chemical viewpoint. Therefore, a comprehensive literature survey on teeth whitening agents and products was conducted. The current whitening methods are analyzed and discussed from a chemist's viewpoint. Frequently used whitening agents are abrasives, antiredeposition agents, proteases, peroxides, and surfactants. In-office bleaching using peroxides is effective, but side effects like tooth sensitivity or a damage of the natural organic matrix of enamel and dentin may occur. The applicability of abrasives in teeth whitening is limited due to potential tooth wear, especially when toothpastes with high RDA values are used. The effect of other whitening agents in vivo is often unclear because of a shortage of placebo-controlled clinical trials.(2,3,4,5)

Concepts of Tooth Whitening:

Many types of colour problems may affect the appearance of teeth, and the causes of these problems vary, as does the speed with which they may be removed.The causes of tooth staining must be carefully assessed for better prediction of the rate and the degree

to which bleaching will improve tooth colour, since some stains are more responsive to the process than others. Lifestyle habits like smoking or consumption of red wine or black tea can lead to darker teeth. Additionally, the tooth color in general also depends on the tooth age.

Discolouration may be extrinsic or intrinsic. Three bleaching approaches have been used: in-office bleaching, at-home bleaching, and a combination of both techniques. For at-home bleaching, studies recommend the use of low concentrations of bleaching agent,10–16% CP or 6% HP, applied for at least two weeks. For in-office procedures, bleaching agents HP 25–40% or CP 35% are applied for shorter time periods. (2,3,4,5)

Nightguard vital bleaching involves applying a gel, carbamide peroxide as the subject slept, by means of a custom-made tray. The paper opened up a new research line as many researchers looked into new techniques, leading to the introduction of several new whitening products, although most used hydrogen peroxide (HP) or carbamide peroxide (CP) as their basis, applying the same directly by means of mouth guards or strips or simply directly applied.(6,7,8)

In-office and home bleaching gels contain hydrogen peroxide or its precursor, carbamide peroxide, as the active ingredient in concentrations ranging from 3% to 40% of hydrogen peroxide equivalent. Hydrogen peroxide bleaching generally proceeds via the perhydroxyl anion. The original color of pure hydroxyapatite (i.e., without substituting foreign ions) is colorless/white, which also broadly holds for the integrated proteins. Consequently, natural enamel has a white color with some translucency. However, due to continuous chemical and mechanical wear of enamel with increasing age (erosion, etc.), the enamel will become thinner and more translucent, i.e., the dentin will become more visible and the overall tooth color will become darker (9,10)

Intrinsic staining, sometimes called internal staining, can be attributed to factors such as genetics, age (from enamel wear over time exposing yellower dentin), antibiotics, high levels of fluoride, and developmental disorders and can start before the tooth has erupted. After eruption of the tooth some dental restorations can cause tooth staining. Extrinsic staining, sometimes called external staining, is largely due to environmental factors including smoking,pigments in beverages and foods, antibiotics, and metals such as iron or copper. Colored compounds from these sources are adsorbed into acquired dental pellicle or directly onto the surface of the tooth causing a stain to appear.(9,10,11)

In an in vitro study seven tooth colored restoration substrates including a nanohybrid composite, a microhybrid composite, a flowable composite, and a packable composite resin, along with a compomer, a glass ionomer cement and a sintered ceramic used for CAD\/CAM restorations were exposed to 40 % hydrogen peroxide gel at either 25 °C or 37 ° C and placed in artificial saliva between treatments. It did not include subsequent abrasion as would occur in vivo and thus loss of restorative material from the softened surfaces is possible.(12,13)

Another in vitro study looked at the effect of home bleaching on color change and translucency of resin composites. Five commercially available composites were treated for 14 days with either 10 % carbamide gel or 10 % hydrogen peroxide gel following manufacturer's instructions. There was significant color change in all of the composites with either of the home-based treatments. They found no significant difference between the carbamide peroxide and hydrogen peroxide treatments in the color changes. Interestingly, there was no change in the resin composite translucency indicating that the color change was restricted to the surface of the resin composites.(14,15)

A randomized clinical trial showed that in-office bleaching of restored teeth using a 35 % hydrogen peroxide product caused tooth sensitivity in all cases. There was significantly greater intensity of tooth sensitivity pain for teeth that had restorations than for sound teeth. It was concluded that in-office bleaching with 35 % hydrogen peroxide was effective for patients with restored teeth, however that a higher degree of pain was found for these patients, especially associated with the upper lateral incisors.(16,17)

The effect of cold-light activated bleaching treatment on enamel surfaces in vitro was studied because there is concern that either heat (infrared) or ultraviolet light exposure of teeth and gingiva during office bleaching could cause pulp and/or gingival tissue damage.Bleaching gels used in clinical treatment may contain HP concentrations of up to 40% causing different degrees of cell damage, although such damage was not observed with 16% CP concentrations5. Meanwhile, the use of 10% HP has been seen to produce effective whitening with no toxic effects on the pulp cells when applied for short periods of time. The exact compositions of clinically available commercial bleaching products are often not completely specified, and they have provided different biocompatibility results in both *in vitro* and *in Vivo approaches. (16,17,18)*

Conclusion:

An increased demand for tooth bleaching has driven many manufacturers and researchers to develop bleaching products to be used either in the dental office or at home. this review article is provided to help clinicians improve their information about the bleaching process and their understanding of the controversial issues regarding the effects of bleaching on teeth, resin composite, and bonding, to help reduce the risks to patients. New studies have shown that aggressive tooth bleaching can cause increased tooth sensitivity, changes in tooth microstructure, and restoration changes. Aggressive bleaching can chemically react with composite restorations, glass ionomer cements, sealants, and ceramic crowns, thus reducing their stability.Clinicians should inform their patients about the possible changes that may occur on their dental restorations during bleaching procedure as well as the possibility of replacement of the bleached restorations at the end of bleaching treatment. Further work is essential to unequivocally demonstrate the benefits of

light-activated bleach. [15] Tooth sensitivity and gingival irritation; the common risks associated with tooth whitening are transient and may be treated with professional help as needed. [16]

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