

Unlocking a Dazzling Smile: The Benefits of Teeth Whitening

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Received date: May 29, 2023, Manuscript No. IPJDCR-23-17367; **Editor assigned date:** June 01, 2023, PreQC No. IPJDCR-23-17367 (PQ); **Reviewed date:** June 15, 2023, QC No. IPJDCR-23-17367; **Revised date:** June 22, 2023, Manuscript No. IPJDCR-23-17367 (R); **Published date:** June 29, 2023, DOI: 10.36648/2576-392X.8.2.145.

Citation: Will R (2023) Unlocking a Dazzling Smile: The Benefits of Teeth Whitening. J Dent Craniofac Res Vol.8 No.2: 145.

Description

Tooth whitening is a blanket term for the process resulting in a material becoming similar in color to a preferred or standard white regardless of the means used. Tooth bleaching has been defined as chemically induced whitening due primarily to the effects of carbamide peroxide which releases about one third of its content as hydrogen peroxide. As the general population becomes more aware of dental esthetics this may be accompanied by an increase in the demand for esthetic procedures as well as increased expectations for treatment outcomes. It is therefore pertinent for dental providers to understand the science behind tooth whitening procedures, their specific indications, success rates, rates of rebound, potential side effects and limitations. Hygiene procedures and polishing are performed to eliminate extrinsic staining by use of an abrasive paste and a rubber cup on a slow speed rotary instrument. Extrinsic stains can influence tooth color assessment and it has been shown that performing dental prophylaxis has a positive effect on patients' perception of the whiteness of their teeth.

The technique removes the surface enamel layer by the combined erosive and abrasive effect of a gel containing both an acid as well as abrasive particles. This is applied mechanically using a low-speed micro-motor. The recommended acid concentration has varied over time with earlier formulations containing as high as 36% Hydrochloric acid. Croll recommended the use of 18% Hydrochloric acid with abrasives in a water-soluble mixture on a low rotational handpiece.

Non-Whitening Toothpastes

Because lesions that are successfully managed using the microabrasion technique must be limited to enamel, a transillumination unit can be used to examine the enamel stain by placing the light source on the lingual or palatal aspect of the tooth. A darker color would indicate deeper staining. Clinical examination of the lesion under dry and wet conditions can also aid in determining ideal candidates for the procedure. A lesion that remains visible on a wet tooth is more likely deeper than one that disappears. This is because the difference in the refractive index between air and enamel is greater than that between water and enamel.

There are several available Over the Counter (OTC) tooth whitening agents that patients can purchase and apply independently. The percentage of bleaching agent contained within a product dictates whether the product can be made available over the counter. The allowed concentration varies among different jurisdictions and is governed by the respective regulatory bodies. The formulations for OTC tooth whitening agents are as follows, dentifrices, mouth rinses, intraoral strips, varnishes, gels and toothbrushes among others.

Because of the potential effect that abrasives may have on the dentition, there are regulations on the maximum allowable abrasive content thus limiting the amount of whitening that can be achieved using these products. Whitening tooth pastes can also contain low concentrations of either carbamide peroxide or hydrogen peroxide whose effect is limited by not only the low concentration but also the limited contact time with the teeth during brushing. Combining bleaching with concurrent use of whitening toothpastes as well as continuing use post-bleaching seems to facilitate the whitening process. A pigment, blue covarine, has also been incorporated into whitening dentifrices. This theoretically creates an optical illusion of whitening by applying blue pigment onto enamel. Covarine containing toothpastes have been found to be just as efficient as conventional whitening toothpastes and non-whitening toothpastes.

Whitening mouthwashes contain a low concentration of hydrogen peroxide (1.5%) and have generally been shown to be ineffective in improving tooth color, even after up to 30 days of exposure. Whitening strips typically contain 5%-14% hydrogen peroxide. This is applied to teeth via the use of an adhesive agent which releases the active bleaching agents slowly over a 6-10 minute period. A systematic review on OTC whitening products included a total of 24 articles and concluded that among the available OTC agents, dentifrices were effective in effecting a change in color but was not as effective as whitening strips. In fact, whitening strips were found to be the most effective OTC whitening agents.

This typically involves application of a high concentration of hydrogen peroxide (35%-40%) for 15-20 minute periods over a 45-60 minute clinical session. This procedure can be repeated for multiple sessions until the desired whitening effect is achieved. Care must be taken to avoid contact of the bleaching agent with the soft tissues as this may be caustic. In-office bleaching often results in a faster bleaching effect due to the

high concentration of bleach that is applied. One week of at home bleaching with 10%-16% carbamide peroxide gel usually results in a change of 2-4 shade guide units while a similar change is noted after a single in office bleaching session with 35% hydrogen peroxide.

Cavity Surfaces

Some in-office bleaching systems are marketed to be used with an activating light source that allegedly enhances the whitening effect. The light source theoretically produces heat that in turn accelerates the catalytic decomposition of the bleaching agent to form free oxygen radicals. The different sources of light include Light Emitting Diodes (LEDs), lasers, Plasma Arc lamps and halogen lamps. A systematic review was conducted to establish whether there were differences in the bleaching efficacy and tooth sensitivity of bleaching protocols performed with or without light using low and high hydrogen peroxide concentrations. It was found that light did not

significantly increase color change in delta E or Shade Guide Units. There was also no difference in tooth sensitivity between the two test groups though they did report high heterogeneity in the data.

Teeth indicated for non-vital bleaching should be asymptomatic with a good quality root filling. Rubber dam isolation is required before preparation of the access cavity. Access cavity design should be aimed at ensuring remnants of restorative materials root filling materials and necrotic pulp tissue are eliminated. Verifying that all remaining pulp tissue is removed from the coronal pulp chamber is important as remnant pulpal tissue in the pulp horns in the more incisal area of the tooth will cause tooth darkening. This is followed by reducing the root filling by 1-2 mm apical to the CEJ which can be done using a Gates Glidden bur. Ensuring the cavity surfaces are free of any debris provides conditions for optimum penetration by the bleaching agent.