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Colour correcting dyes for teeth: a modern take on teeth whitening at home

[1]Dr Riya Pragnesh Patel, BDS, Goregaon Dental Centre, India

[2]Dr Anoli Agrawal, MDS, Public Health Dentistry, Assistant Professor, Department of Public Health Dentistry, ACPM Dental College, Dhule, Goregaon Dental Centre, India

[3]Dr Naval Ghule, BDS, Goregaon Dental Centre, India

Corresponding Author: Dr Riya Pragnesh Patel, BDS, Goregaon Dental Centre, India

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Abstract

Introduction: Tooth discoloration is a very common issue and there are a variety of solutions depending upon their cost, efficiency span and skill needed to use the kit, available to deal with it in the market. This study compares the benefits of the traditional at home and in office methods to the latest invention of using color correcting dyes for discoloration of teeth.

Methodology: Studies from PubMed, Google scholar and American Dental Association Library are used to compare the efficacy of OTC color correcting dyes to combat tooth discoloration to the in-office methods and tradition at home methods.

Result: The OTC color correcting serum do not help in treating the yellowness or discoloration of teeth but provides an illusion of whiter teeth by using the color theory.

Conclusion: The OTC color correcting serum acts on the basis of the color theory and masks the yellowness with purple-blue dyes giving the illusion of whiter teeth. It a very convenient, fast and cost effective method, but it's not a permanent solution.

Keywords: Enamel, Hydrogen Peroxide, OTC Color, Purple Serums

Introduction

In recent years with the growing popularity of social media and the strive to achieve a perfect look and aesthetics, there has been a spike in the demand for over-the-counter (OTC) teeth whitening products as professional teeth whitening can be expensive. People have employed traditional at-home teeth whitening methods for many years, these include using baking soda and hydrogen peroxide, whitening toothpaste, oil pulling, activated charcoal and apple cider vinegar. These techniques have lost their popularity due to limited whitening power and slow results, along with

extensive preparation and application time, enamel safety, and gum and tissue irritation.

Currently, a new product has been gaining a lot of popularity, claiming to provide temporary results by using colour theory for stained teeth. These purple-blue dyes tend to neutralize yellow-brown stains on teeth.

Teeth whitening agents rely on active ingredients such as hydrogen peroxide (H2O2) and its form, carbamide peroxide.[1] Meanwhile, colour-correcting agents use colour theory, by applying complementary colours to the yellow spectrum such as purple and blue and creating an illusion of whiter teeth. [2]

Enamel is the hard outermost layer of the tooth and it is translucent in appearance, underneath enamel, there is dentin which has a slight yellowish appearance. Enamel is crucial in protecting teeth from decay and sensitivity. Even though the OTC whitening agents have widespread use their effect on enamel is concerning, as the aggressive action of the bleaching agents can potentially compromise the integrity of enamel leading to erosion of the surface causing increased tooth sensitivity and even paving the way to deep dental caries. [3]

This article explores the efficacy of OTC teeth colour-correcting serums and their impact on enamel. This article will present a detailed examination of the latest research on over-the-counter teeth colour-correcting serums. It will delve into their primary components, how they function to whiten teeth, and the potential hazards associated with their usage. By looking at both the advantages and disadvantages, this review aims to provide a thorough and impartial viewpoint on these products, along with practical advice for their safe and effective application.

Methodology

This study was conducted to determine the efficacy and safety of OTC teeth colour-correcting serums. To review the literature, studies were selected from PubMed, Google Scholar and the American Dental Association Library. Keywords included “OTC teeth whitening”, “Colour correcting serum”, “enamel erosion”, and “tooth sensitivity”. The review aims to provide a thorough and balanced evaluation of OTC teeth colour-correcting serums and traditional at-home whitening methods, highlighting their benefits and potential risks.

What Is Colour Correction?

Colour correction is a very vastly used technique in day-to-day things that we experience like television, cinematography, lighting and photography. Colour gels or filters are used to alter the overall colour of the light. The complementary colours are considered to cancel each other out and produce a grey scale colour like white or black.[4]

By applying the same principle on tooth surface, the yellowness on the tooth surface can be neutralized by its complementary colour dye like purple or blue.[5]

A colour wheel shows complimentary colours which neutralize each other.

The phenomenon of colour correction being applied in aesthetic dentistry is a very new approach towards getting whiter teeth. There are purple serums available in market which promises to cancel out the yellowness and give instant results. It is considered a type to teeth make up, other such products like teeth gloss and white out pen are also available to provide instant whiter and brighter teeth.

Traditional At-Home Teeth Whitening Technique: Benefits and Drawbacks

When we talk about traditional teeth whitening it includes using household products in order to gain whiter appearance of teeth and it also includes teeth whitening methods which are outdated and have more side effects than benefits.

Since the introduction of Nightguard vital whitening in 1989 the popularity of dental whitening has increased, a large number of people are now concerned about the appearance of their teeth.[7]

The most common over-the-counter at-home teeth whitening systems available in the market are charcoal toothpaste with active charcoal, and teeth whitening strips apart from this a lot of at-home teeth whitening was done using things available in the kitchen like baking soda, and oil pulling.

The advantages of using such a technique are that it is very convenient and a cheaper option compared to in-office treatments, these products act as mild abrasive agents which remove the build-up of plaque. Most charcoal toothpastes have a range of 26-166 RDA and 0 -14 REA, they can be extremely abrasive as it's proven to increase surface roughness and if used for a long period of time can cause teeth sensitivity. Most of the charcoal toothpaste does not contain fluoride in it which has a harmful effect on teeth. [8,9]

When it comes to teeth whitening strips, they are thin flexible strips coated with whitening gel, mostly hydrogen peroxide or its derivatives providing significant reduction in yellowness and increased lightness.[10] As it contains Hydrogen peroxide, (acidic in nature) using it frequently can cause erosion of the enamel surface and decreased mineral concentration which is deleterious to the tooth integrity. [11] It can also cause gingival irritation as hydrogen peroxide is proven to damage soft tissue.[12] Though the effects are temporary, it can cause a lot of discomfort to the patient and it can rarely lead to tooth damage if there any untreated cavities or gum disease.

As mentioned above the easiest available sources of teeth whitening are Baking soda and oil pulling. Baking soda has an abrasive effect on teeth and thus it helps in getting rid of newly built plaque. It has an RDA ranging from 35 to 132 which comes under low to mildly abrasive. It is also available in the form of toothpastes with different concentrations of baking soda in it. It has biological compatibility and acid-buffering action and can also act as an antibacterial if present in high quantity. Baking soda or baking soda toothpaste can be considered the safest at-home teeth whitening substance due to its nature.[13]

When it comes to oil pulling it does not act as a whitening agent itself. Oil pulling is a traditional method where 1 tablespoon of oil is pulled between the teeth for 15- 20 minutes and spat out when it is white and milky. This removes bacteria and stimulates saliva production. [14] This indeed helps with the reduction of plaque and its formation and promotes good oral hygiene. It doesn't have any side effects but can cause sore jaws from the pressure required in doing this procedure. The most common and easily available oil for it is coconut oil.

In-Office Teeth Whitening: Benefits and Drawbacks

In-office teeth whitening is a much faster and more lasting way of achieving whitening effect as higher concentration of PH is delivered than OTC. Along with that gingival protection is also provided before starting the process of teeth whitening. Light activation of the product might be required to speed up the chemical process. The teeth lightening results are seen after 30 to 60 mins of the treatment. [15]

Gum and tooth sensitivity are much more controllable due to thicker peroxide gels which do not soak into teeth, along with that desensitizing agents like potassium nitrate and fluoride are also used.

In office treatments are considered most effective when the patient has stains caused by aging, or consumption of food like coffee, sodas and red wine or tobacco. It is not very effective with stains caused by trauma, tetracycline antibiotics and fluorosis. Apart from this it is very costly compared to at-home treatments and it needs constant follow-up appointments as the results are not permanent.

Colour-correcting serum for teeth

Colour-correcting serums for teeth are serums containing dyes like Cl17200/D&C Red No. 33, Cl42090/FD&C Blue No.1, and Ethylhexylglycerin. These dyes are synthetic colourants that help to cancel out the yellow stains present on the tooth surface.

Many serums like HiSmile's V34 colour corrector, smile 360 teeth whitening, aura colour correcting whitening serum and Perfora Purple magic whitening serum are available easily in the market.

Most of these products do not contain hydrogen peroxide as it works on colour correction theory thus the results achieved by these products are not long-term.

Effect of colour correcting serum on enamel

Most color-correcting serums are favored for their immediate whitening effect, as they neutralize yellow tones on the surface of teeth, creating the appearance of a whiter smile. These serums are non-erosive, meaning they cause minimal harm to enamel compared to other at-home or in-office teeth whitening treatments.

Products like Hismile V34 Colour Corrector and Smile360 V34 Colour Corrector Teeth Whitening Serum contain ingredients such as glycerin, water (aqua), sorbitol, hydrated silica, xylitol, peppermint oil, and various colorants (CI17200/D&C Red No. 33 and CI42090/FD&C Blue No.1), along with stabilizing agents like phenoxyethanol and ethylhexylglycerin. Importantly, these products do not include bleaching agents. Instead, they work by reacting with stain molecules to balance yellow undertones. However, the effect is not long-lasting.[16]

Similarly, the Perfora teeth whitening serum, while offering lower efficacy, is considered safe for long-term use. It is free from harsh chemicals such as titanium oxide, sodium lauryl sulfate, sodium fluoride, and sodium hydroxide, all of which are regulated in cosmetics in Australia. The gel formula makes it easier to access hard-to-reach areas between teeth compared to abrasive toothpastes or whitening strips. Additionally, it contains nano-hydroxyapatite, a biocompatible and non-toxic compound that is gentle on oral tissues.[17]

Mechanism of action

The primary mechanism of action for teeth whitening serums is based on colour theory. These products use the principle that colours opposite to each other in the colour wheel neutralize each other. The purple dyes in these serums counteract the yellow tones on the teeth creating an optical illusion of whiter teeth. The effect of this is immediate and temporary as it does not involve the use of any bleaching agents. The serum contents do not penetrate the enamel surface deeply.[16]

Usage of this product is also very easy, you can either use this along with your normal brushing routine or separately. Take a generous amount of the serum on your toothbrush and brush your teeth normally, followed by rinsing with water.[16]

Advantages of using colour-correcting serum for teeth whitening

The biggest advantage of using these serums is that it provides instant results, without damaging the enamel surface. The process of using it is easy and quick

compared to the tricky application of the whitening strips and traditional whitening methods. It is also sage for gingiva as it does not contain any bleaching agent.[16]

Disadvantages of using colour-correcting serum for teeth whitening

The disadvantage of colour-correcting serum is that it gives temporary results and doesn't actively remove the stain but just neutralizes it and gives an optical illusion.

Using these serums can be tacky as there is a potential for uneven application, which could give an uneven whitening appearance.[16]

Furthermore, if used often it could cause irritation to the gums. Thus, one should make sure that they are applying the product carefully. This could be time-consuming.

Using these products often to gain results regularly can be costly as a person using these serums that provide temporary results will use up the product often at a fast rate.

As we know these serums work on the surface by interacting with the stain particles and giving a neutralized effect and they are not effective for deep and intrinsic stains of teeth. One of the limiting factors would be its limited whitening power.

The result of using this product is not consistent and would not provide a clear bright appearance of teeth with every use as it is based on application and the color gradient of the stain.

Conclusion

In conclusion, teeth whitening methods vary significantly in terms of cost, ease of use, and long-term effects. Traditional home-based remedies, such as using baking soda or hydrogen peroxide, are affordable and easily accessible, but they often require precise application and can potentially harm oral tissues if misused. Although these methods might yield some visible improvement, they are generally less effective and pose a higher risk of damage to the enamel or gums.

On the other hand, professional in-office whitening treatments provide more consistent, safer, and longer-lasting results. Dentists use advanced formulas and procedures that not only deliver effective whitening but also ensure the preservation of oral health. However, these treatments are typically expensive and out of reach for those seeking a more budget-friendly option.

This is where over-the-counter teeth-whitening serums offer a convenient middle ground. Products like Hismile V34 and Smile360 V34 Colour Corrector are designed for quick results by neutralizing yellow undertones and providing the illusion of whiter teeth. While these serums are not a permanent solution, they are useful for short-term, occasional use, such as before a special event. The absence of harsh bleaching agents also makes them a safer option for enamel compared to some other at-home or professional methods.

However, regular use of these serums might not be ideal, as they only provide a cosmetic fix and do not address the underlying causes of discoloration. For lasting results, more comprehensive treatments, including professional whitening or lifestyle changes, may be necessary.

References

1. Carey CM. Tooth whitening: what we now know. J Evid Based Dent Pract. 2014;14(Suppl):70-6
2. Gonchar M, Kreider M, Rouleau T. Purple toothpaste and its impact on tooth colour: A clinical perspective. J Cosmet Dent. 2023;29(2):101-107.
3. Basting RT, Rodrigues Júnior AL, Serra MC. The effects of seven carbamide peroxide bleaching agents on enamel microhardness over time. J Clin Dent. 2021;32(1):27-32.

4. 4. Color correction [Internet]. Wikipedia, the free encyclopedia. 2023 [cited 2024 Sep 20].
5. 5. da Costa JB, McPharlin R, Paravina RD, Ferracane J, Mazur RF. Evaluation of the effectiveness and safety of over-the-counter oral products to whiten teeth: A systematic review. Dent J (Basel). 2023;11(2):50.
6. Ishan83. Hair Color Blogger [Internet]. [cited 2024 Sep 20]. Available from: https:// ishan83. wixsite. com/haircolorblogger.
7. Blanchard D, van Wissen K. Home-based chemically-induced whitening (bleaching) of teeth in adults: A summary of a systematic review. Public Health Nurs. 2020;37(4):626. doi: 10.1111/ phn. 12713.
8. Barth de Andrade Luz S, Melo da Cunha Oliveira RI, Alvares Leite Guanabara L, Barros Viana B, Tibau Aguiar Dias R, Dantas Batista AU, et al. Effect of whitening dentifrices on dental enamel: an analysis of colour, microhardness, and surface roughness in vitro. Quintessence Int. 2024 Jun 27;0(0):0. doi: 10.3290/j.qi.b5517931. Epub ahead of print. PMID: 38934774.
9. Zoller MJ, Hamza B, Cucuzza C, Gubler A, Attin T, Wegehaupt FJ. Relative dentin and enamel abrasivity of charcoal toothpastes. Int J Dent Hyg. 2023 Feb;21(1):149-156. Published online 2022 Nov 7.
10. Devila A, Lasta R, Zanella L, Agnol MD, Rodrigues-Junior SA. Efficacy and adverse effects of whitening dentifrices compared with other products: A systematic review and meta-analysis. Oper Dent. 2020 Mar-Apr;45(2). doi: 10.2341/18-298-L. Epub 2019 Nov 18. PMID: 31738695.
11. Ps S, Karumaran CS, R SA, Manuel CE, V JC, Stalin R. An in vitro study on the effects of hydrogen peroxide-based bleaching agents on enamel: Field emission scanning electron microscopy (FESEM) with energy dispersive spectroscopy (EDS) evaluation. Cureus. 2024 Apr 15;16(4). doi: 10.7759/cureus.58318. PMID: 38752025; PMCID: PMC11095582. 4o mini
12. Tredwin CJ, Naik S, Lewis NJ, Scully C. Hydrogen peroxide tooth-whitening (bleaching) products: review of adverse effects and safety issues. Br Dent J. 2006 Apr 8;200(7):371-6.
13. Hara AT, Turssi CP. Baking soda as an abrasive in toothpaste: Mechanism of action and safety and effectiveness considerations. J Am Dent Assoc. 2017;148(11):828-835. doi: 10.1016/ j.adaj. 2017. 09.007.
14. Colgate. What is oil pulling? What you need to know [Internet]. [cited 2024 Sep 20]. Available from: https://www.colgate.com/en-us/oral-health/teeth-whitening/what-is-oil-pulling-what-you-need-to-know.
15. Carey CM. Tooth whitening: what we now know. J Evid Based Dent Pract. 2014;14(Suppl):70. doi: 10.1016/j.jebdp.2014.02.006.
16. Hismile. Colour Corrector [Internet]. [cited 2024 Sep 20]. Available from: https:// ca. hismileteeth. com/products/colour-corrector/ ?_gl=1* ro6o85* _up*MQ..&gclid=CjwKCAjw_Na1BhAlEiwAM-dm7Iq_xSgJhC1E79OQE1zr9fR6URgpwPNc9bs7IH4-QTkwu81n5KvSgxoCYywQAvD_BwE.
17. Ranjan M, Goyal M. Effect of Three Different Whitening Toothpastes on Color Stability of Nano-Hybrid Composite Resin: An In Vitro Study. Cureus. 2023;15(9):e294083. Available from: https://assets.cureus.com/uploads/original_article/pdf/294083/20240912-113017-eh1ugl.pdf