

# Analysis of Current Problems of Toothpaste and Mouthwash through US Market Research

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## ABSTRACT

New policies regarding wearing masks were recently enforced in order to prevent the spread of COVID-19. One of the big drawbacks was the issue of oral health such as bad breath and bacteria propagation. In this paper, widely used dental care products are introduced based on US market statistics, and the safety of their ingredients is measured in order to suggest the safest and most effective dental products for people based on age groups or diseases. Lastly, this paper aims to improve global oral health in the long run by presenting ideas for further studies as well.

**Keywords:** Oral Health, Toothpaste, Mouthwash, Surfactant, Whitening, Alcohol, CPC

**Subject:** Healthcare

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## INTRODUCTION

“Depending on an individual’s cultural background, facial cues in different parts of the face are weighted differently when interpreting emotions” (Yuki, 2007). Compared to Asian countries, people from Western cultures focus on the mouth as a cue to recognize emotion (Yuki, 2007). While people in Eastern countries use emotions with smiling eyes, people in Western countries emphasize smiling mouths. Since the mouth is the most expressive part of the face, maintaining good-looking teeth is important in Western culture (Yuki, 2007).

The current US toothpaste and mouthwash industry reflect this trend. Most of the products focus on the aesthetic effects, ignoring the side effects of high concentrations of chemicals. This paper aims to research the US oral health market and focus on best-selling products’ ingredients in order to underscore the ongoing problem, thereby raising awareness and enhancing oral health.

### **Toothpaste Ingredients and Industry**

Toothpaste ingredients vary based on the products, but there are key common elements that are included in the most popular toothpaste. According to the 2019 Toothpaste Market Report, P&G, Sensodyne, and Colgate-Palmolive showed the highest sales. Crest 3D white was the exceptionally leading toothpaste in the US, resulting in \$263.9 million sales (Petruzzi, 2022). The second and third place went to Sensodyne Pronamel with \$196.7 million sales and Colgate Optic White with \$192 million sales (Petruzzi, 2022).

It is worth noting that all those three kinds of toothpaste contain surfactant and whitening products. Even in the Crest 3D white and Colgate Optic White, the trend of focusing on the aesthetic effect rather than oral health can be found. Although whitening teeth is an appealing option, it can be done by proper tooth brushing methods rather than choosing toothpaste with chemicals. Since it can be estimated that people use toothpaste at least twice a day, considering ingredients and their concentration is very important for oral health.

Surfactants such as SLS, PEG, and CAPB are included in toothpaste in order to make foams (Alli, 2019). Foams may help eliminate food remaining in the mouth and fluoride to get into contact with teeth easily. However, these effects become useless if proper tooth brushing is done. There are several side effects that may cause long-term health problems. According to research regarding recurrent aphthous stomatitis (RAS), “the usage of SLS free dentifrice consistently reduced all parameters of ulcers measured (number, episodes, duration, and pain), and each of these

reductions were statistically significant” (Alli, 2019). The paper suggests that patients with RAS may benefit from using SLS-free toothpaste. Moreover, “exposure to higher SLS concentrations ( $\geq 0.15\%$ ), epithelial thickness, cell proliferation, and E-cadherin expression gradually decreased and in the central areas of exposed regions, cells detached from each other and underwent cell death” (Neppelberg). If humans are exposed to a high concentration of SLS, there can be alteration in mucosal thickness or severe cell destruction.

Whitening teeth by oxidizing also causes harm to the mouth (Bistey, 2007). Hydrogen peroxide is an acidic chemical. It is not only used in toothpaste but also in household cleaning products and bleaching agents. It is a powerful oxidizer. Thus, regulating the concentration of hydrogen peroxide is essential. If not, it can cause alteration in enamel: “The alteration in enamel was proportional to treatment time and hydrogen peroxide concentration. Higher concentration and longer treatment time resulted in more severe alterations” (Bistey, 2007). Moreover, enamel breakdown then causes tooth sensitivity to temperature changes (Bistey, 2007). With enamel structure, the tooth’s outer protective layer is altered and dental canaliculi is exposed. External events stimulate nerves, making them sensitive to heat and cold (Bistey, 2007). According to the Scientific Committee on Consumer Products of the European Commission, “above 0.1% hydrogen peroxide, tooth bleaching is not just a simple cosmetic procedure. Dentists should diagnose the cause of the staining, check whether patients have any other oral health problems, and counsel patients about the best way of dealing with this esthetical problem” (SCCP). However, Colgate-Palmolive company announced that the Colgate Optic White Pro Series, which is the sub-series of Colgate’s best-selling product, contains 5% hydrogen peroxide (Colgate). Since the high concentration can be dangerous, strict regulation must be provided.

### **Mouthwash Ingredients & Industry**

The most commonly used mouthwashes contain similar key components. According to the 2018 mouthwash report in the US, brands like Listerine, Crest, and Crest Scope were the most common. The ingredients of the most sold mouthwash product from each of these three companies were referenced. All three mouthwash products either contained CPC or alcohol, or even both.

The main function of alcohol in mouthwash is to stabilize the formula and protect it against microbial contamination by working as a preservative (Crest, 2022). Alcohol is not the active ingredient in alcohol-containing mouthwashes. However, alcohol has negative effects on your mouth. Alcohol-containing mouthwashes are prone to causing a burning sensation in users’ mouths when in use. It also functions as a drying agent that inhibits saliva production (Crest, 2022). At high concentrations, alcohol contributes to dry mouth, causing the worsening of bad breath and the growth of more germs (Jarry, 2018). Alcohol is known to kill bacteria in your mouth, but according to data, “Beers are 3-8% alcohol; wines are 7-18%; while spirits are 30% or greater. The disinfecting alcohol you buy at the drugstore is 70-99% alcohol. By comparison, mouthwashes have concentrations of alcohol up to 25%, which fall short of an antiseptic effect” (Jarry, 2018). An oral hygiene products brand Colgate suggests that especially people who suffer from burning mouth syndrome, or other oral irritations should avoid using mouthwash containing alcohol because it has a burning sensation. Patients experiencing low saliva flow are also recommended to use alcohol-free mouthwash as it does not dry out the mouth (Colgate 2022).

CPC, short for cetylpyridinium chloride, is used in many commonly used mouthwash products for a few reasons. CPC is used in mouthwashes as a compound that works against dental plaque (Crest, 2022). It can help prevent plaque from maturing and prevents gum diseases that cause bacteria to grow. CPC is used as a foaming agent in Crest Scope Classic Mouthwash. It is used as an active ingredient to kill bacteria and help prevent and reduce plaque and gingivitis in Crest Pro-Health Gum and Breath Purify Mouthwash. However, CPC is only effective against plaque and gingivitis when 72-77% chemically available CPC is formulated at 0.045-0.1% concentrations. The problem with CPC is that it is capable of leaving a brown stain on teeth, restorations, and tongue. It also causes oral burning, taste alterations, ulcers, and stomatitis. Ulcers are open sores, while stomatitis is an inflamed and sore mouth, which both cause pain when eating and talking. People from ages 10-40 are more likely to experience mouth ulcers, and women and people in their teens and 20s are more vulnerable to stomatitis. Thus, these demographics should avoid using mouthwashes containing CPC.

### **CONCLUSION**

In this paper, a deep examination of the ingredients included in the most popular oral care products in the US was done. Although reliable resources were selected to support the claim, there are still ongoing debates on the influence of ingredients in toothpaste. One of the most controversial topics that were not mentioned directly was the effect of CPC - whether it creates tartar when used with toothpaste containing SLS. Moreover, sodium saccharin in dental care products has been an issue; it is used for flavoring and some people claim that the weird lack of freshness is due to saccharin. Therefore, the paper covered the most examined and least controversial ingredients for greater reliability of the results.

The biggest trend with toothpaste is to make teeth *look* clean and white. Product users should also *feel* like their teeth are being cleaned. For whitening, chemical compounds such as hydrogen peroxide are overused to the extent that they can even harm enamel, resulting in a sensitive reaction to the change in temperature (Bistey, 2007). Moreover, the surfactant is commonly used while it is obvious that the drawbacks outweigh the benefits. Foams made by surfactant help consumers feel that the toothpaste is more effective while sub-benefits created by foams such as cleaning food remains in the mouth are very minimal. Therefore, it is very important to avoid using toothpaste containing surfactants and check the concentration of bleaching agents and whether it is safe to use or not.

Mouthwash is another widely used dental care product besides toothpaste. The main ingredients covered were alcohol and CPC. The role of alcohol is to kill bacteria and make the manufacturing process easier, but those activities turned out to be ineffective (Crest). Moreover, it can make a non-drunk driver get a blood alcohol level above the standard or worsen bad breath and burning sensation (Hughes, 2008). People suffering from burning mouth syndrome or low saliva flow should avoid using mouthwash that includes alcohol. Unlike alcohol, CPC in mouthwash has clear gain and loss. It definitely does the cleaning role of the dental care product, but the drawback is that it can cause some irritations in the mouth. Due to this defect, age groups who are prone to experience mouth ulcers or stomatitis, which are painful sores, should be careful with the concentration of CPC (Alli, 2019).

The goal of this paper is to convince readers to grab the bases of dental products and read the dental health trend in the US before using the products. The long-term aim is to suggest topics for further research that can contribute to oral health. Inspired by this paper, the next step is to experiment with human teeth in order to set the standard for the proper concentration of controversial ingredients such as SLS and CPC considering real-life statistics such as average minutes people spend brushing their teeth or common brushing habits that need to be fixed. Lastly, after the experiment, campaigns to raise awareness on oral health and how to brush teeth effectively will definitely be entailed.

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