

# Effects of Alcohol Containing Mouthwash on Oral Tissue: A Review

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## 1. Introduction

Mouthwash, is a liquid which is held in the mouth passively or swilled around the mouth by contraction of the perioral muscles and/or movement of the head, and may be gargled, where the head is tilted back and the liquid bubbled at the back of the mouth. Usually mouthwashes are an antiseptic solution intended to reduce the microbial load in the oral cavity, although other mouthwashes might be given for other reasons such as for their analgesic, anti-inflammatory or anti-fungal action. Most individuals do not adequately brush their teeth, and only 11 to 51% of the population admits to using dental floss or some type of inter-dental cleaning device on a daily basis. (1) The daily use of an effective antiseptic mouth rinse is generally considered a simple strategy most patients can easily incorporate into their home care routine.

The mechanical elimination of dental plaque is the basis of the prevention and the treatment of gingivitis and periodontitis. Prevention may be partially achieved by conscientious daily brushing and flossing to remove plaque that forms each day before inflammation occurs. (2) However, inefficient brushing and inadequate flossing by most people can lead to an accumulation of plaque and ultimately gingivitis, particularly in areas that are difficult to reach. (3) Using chemotherapeutic agents is one approach to help control plaque accumulation in these areas.

Using an antiseptic mouth rinse to supplement mechanical plaque removal can produce an antimicrobial effect throughout the mouth. (4) Chemical agents in a mouth rinse should be effective at modifying the microbiota by selectively eliminating pathogens without negatively impacting the normal flora that may result in an overgrowth of pathogenic organisms. Evidence shows that the long-term twice daily use of 0.12% chlorhexidine gluconate and essential oils and methyl salicylate, both anti-plaque and anti-gingivitis mouth rinses approved by the Council on Dental Therapeutics of the American Dental Association (ADA), do not have a negative effect on the oral microbial flora. (5)

Most common ingredients in mouthwash:

- 1) Thymol (2-isopropyl-5-methylphenol):  
Potential for Harm – Thymol is dangerous to the environment and toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment. It is also being investigated as a mutagen
- 2) Eucalyptol:

Potential for Harm – In higher than normal doses eucalyptol is hazardous when taken internally or when inhaled. It can have acute health effects on behavior and the respiratory tract as well as the nervous system. It is general recognized as being a reproductive toxin for both males and females.

- 3) Hexetidine (Oraldene):  
Potential for Harm – Too much of this drug taken internally leads to severe chronic conditions such as clotting in the principal part of the brain which integrates complex sensory and neural functions. This causes these functions to fail.
- 4) Methyl Salicylate:  
Potential for Harm - In its pure state, methyl salicylate is toxic. This is especially true when taken internally. A teaspoon of methyl salicylate contains roughly 7g of salicylate, which is the equivalent of over twenty-three 300 mg aspirin tablets. The smallest lethal dose for an adult is 101 mg/kg body weight.
- 5) Benzalkonium chloride:  
Potential for Harm – Benzalkonium chloride is an allergen. There are ongoing concerns that its repeated use may have some (as yet undiscovered) side effects in medical and hygiene products. However, studies have already shown that its use in contact lens solutions over time can cause irreversible damage to the eye evidenced by punctures of the corneal epithelium.
- 6) Cetylpyridinium Chloride:  
Potential for Harm – This chemical unfortunately causes extrinsic tooth staining. It also has an unpleasant taste and can adversely affect the taste of food and drink, It is also responsible for causing sensitivity, irritation and pain in the tongue due to its high alcohol content.
- 7) Methyl paraben:  
Potential for Harm – Methyl paraben has been considered as non-toxic for many years and it's use is widespread as a product preservative. However recent tests indicate skin irritation and contact dermatitis and Rosacea occur in individuals with paraben allergies.
- 8) Hydrogen Peroxide:  
Potential for Harm – Hydrogen Peroxide is listed as being highly dangerous and injurious to health for workers handling this chemical. Danger comes from its vapor as well as through swallowing or skin contact. Obviously the amounts contained in oral products are controlled; however, there are always doubts and concerns when long-term use of toxic chemicals and the potential for the accumulation of harm may be an issue.

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9) Alcohol:

Potential for Harm – There are a number of possible outcomes to swilling your mouth twice a day with up to 27% alcohol solution:

Because alcohol is a drying agent, it can reduce saliva and add to bad breath problems.

More importantly – a report published in the Dental Journal of Australia concluded there is “sufficient evidence” that “alcohol-containing mouthwashes contribute to the increased risk of development of oral cancer”. This report has been discussed and debated by responsible sections of the media and is being actively investigated by Government health departments across the world, all very interested to get some clarity on this important discovery. (6)

## 2. Literature Review

### Potentially harmful effects of alcohol based mouth rinses:

#### Xerostomia

Xerostomia is a subjective perception of dryness of the mouth resulting from one or more factors that affect the quantity and quality of the salivary flow. It may lead to soft tissue discomfort, difficulty in chewing and swallowing, caries, insomnia, fungal infection and halitosis. All these conditions may cause a negative impact on a patient's life quality.(7)

A comparative study investigating the effects of mouth rinsing with an alcohol-based solution against mouth rinsing with an alcohol-free solution does not point to significant differences between both types of solutions after a week's use as regards salivary flow and dry mouth symptoms in healthy adult subjects.(8)

#### Burning or sore sensation

Some patients have reported a burning or sore sensation in the oral tissues after using an alcohol-based mouth rinse.(9) Alcohol may cause a painful sensation that is directly subordinated to its concentration level and to length of rinsing. Alcohol-based mouth rinses are not recommended for patients with existing soft tissue injury.

The longer the rinsing the more painful it feels. This sensation declines and eventually ceases when the product is

no longer used. While ethanol is the key pain-inducing factor, other agents may also augment the symptom. Recent research reveals that the burning and painful sensation in the soft tissues is also felt when alcohol-free solutions are used.(10)

Lower alcohol level and the addition of a mild flavoring agent have yielded good results in reducing the burning or sore sensation. Diluting the product for initial use and then gradually increasing its concentration has shown to have higher acceptance by patients.(11)

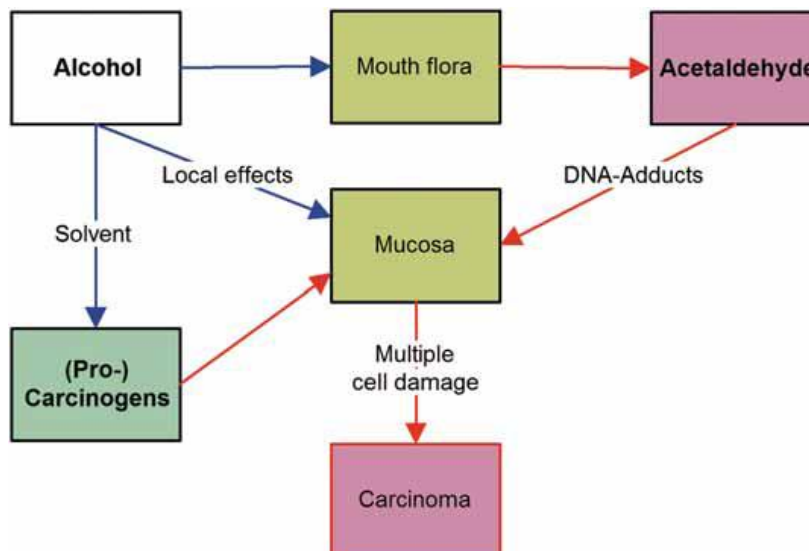
#### Carcinogenicity of Ethanol

The recent evaluation of ethanol as carcinogenic to humans must be considered in the risk assessment of alcohol-containing mouthwashes. This paragraph summarizes the scientific proof for this association, which has been primarily derived from epidemiological studies about the ingestion of alcoholic beverages.

In February 2007, the WHO's International Agency for Research on Cancer (IARC) re-assessed the carcinogenicity of alcoholic beverages in the context of the IARC monographs programme. 'Ethanol in alcoholic beverages was classified as 'carcinogenic to humans (Group 1). The detailed IARC evaluation is available as a meeting summary on the internet (12), as well as in The Lancet Oncology (13).

Overall, the IARC concluded that the occurrence of malignant tumors of the oral cavity, pharynx, larynx, esophagus, liver, colorectum, and female breast is causally related to alcohol consumption (13). Because the associations were generally noted with different types of alcoholic beverages, and in view of the carcinogenicity of ethanol in animals, the IARC now considers ethanol itself (not other constituents or contaminants) as causative of the carcinogenicity of alcoholic beverages.

Many epidemiologic studies of different design and in different populations around the world have consistently shown that regular alcohol consumption is associated with an increased risk of cancers of the oral cavity, pharynx, larynx, and esophagus (14). Daily consumption of around 50 g of alcohol increases the risk of these cancers by two to three times compared with non-drinkers (13,15-16).



**Figure:** Simplified model of the mechanism of carcinogenesis in the oral mucosa after using alcohol-containing mouth rinses

### 3. Use by alcohol addicts

The sale of alcoholic beverages on Sundays is forbidden in several American states. Some reports discuss the case of alcohol addicts who are craving for alcohol and so resort to alcohol-based after-shave lotions, fuels or mouth rinses as a substitute for alcoholic beverages.(18,19) The dependence on such products has been recorded and is primarily related to easy access to such products rather than to social or financial factors.(19) When taken in large quantities, mouth rinses can contribute to severe metabolic acidosis, multiple organ failure, and even death.(20)

The use of alcohol-based mouth rinses is not recommended for those who are recovering from alcohol addiction, as it can drive them back to craving for alcohol and addiction. (21)

### 4. Discussion

There is now sufficient evidence to accept the proposition that developing oral cancer is increased or contributed to by the use of alcohol-containing mouthwashes. Whilst many of these products may have been shown to be effective in penetrating oral microbial biofilms in vitro and reducing oral bacterial load, it would be wise to restrict their use to short-term therapeutic situations if needed. Perhaps the use of mouthwashes that do not contain alcohol may be equally effective. Further, mouth rinses should be prescribed by dentists, like any other medication. There may well be a reason for the use of alcohol-containing mouth rinses, but only for a particular situation and for a limited and controlled period of time. As such, patients should be provided with written instructions for mouthwash use, and mouthwash use should be restricted to adults for short durations and specific, clearly defined reasons. It is the opinion of the authors that, in light of the evidence currently available of the association of alcohol-containing mouthwashes with the development of oral cancer, it would be inadvisable for oral healthcare professionals to recommend the long-term use of alcohol-containing mouthwashes.

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