

Role of mouthwash in prevention of Covid-19: A review

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Abstract: The corona virus disease 2019 (COVID-19) caused by severe acute respiratory syndrome corona virus 2 (SARSCoV-2), first detected in Wuhan, Hubei province of China, has emerged rapidly as a health crisis that has challenged health systems and health professionals all over the world. Transmission occurs primarily through droplet spread or contact routes. Due to these characteristics dental staff and dental practitioners are considered to be at the highest risk of acquiring SARS-CoV-2 infection because of their prolonged face to face exposure to patients and exposure to respiratory secretions and aerosols produced during procedures like ultrasonic scaling and cavity/access preparation using a high-speed air rotor with water jet cooling systems. Antiseptic mouthwashes have been widely used as a standard measure before routine dental treatment, especially preoperatively. They have an essential role in reducing the number of microorganisms in the oral cavity. Hence, present review of literature provides details on role of mouthwash in prevention of Covid-19 transmission.

Keywords: Covid-19, SARS-CoV-2, Pre-procedural mouth rinse

Introduction: The corona virus disease also known as COVID-19 is a viral infection that first reported in Wuhan, China in December, 2019, which rapidly involve the most of countries in world.¹ COVID-19 is caused by severe acute respiratory syndrome corona virus (SARS-CoV-2)², which can be transmitted by direct or indirect contact with infected persons. Direct transmission may happen when infected secretions or droplets from a contaminated person reach the oral, nasal and/or conjunctival mucosa of a susceptible host when the former coughs, sneezes, breaths or talks. SARS-CoV-2 is primarily transmitted through respiratory droplets (particles > 5 µm in diameter), but recent findings suggest that virus transmission may be possible through aerosolized droplet nuclei (particles ≤ 5 µm in diameter).³ While

droplets quickly settle to the ground or to surfaces and travel to shorter distances, droplet nuclei can be suspended in the air for longer times and may travel to longer distances. Indirect transmission is possible through hand-mediated transfer of the virus from contaminated objects or surfaces (fomites) to the before mentioned mucosa.⁴

Dental staff and dental practitioners are considered to be at the highest risk of acquiring SARS-CoV-2 infection because of their prolonged face to face exposure to patients and exposure to respiratory secretions and aerosols produced during procedures like ultrasonic scaling and cavity/ access preparation using a high-speed air rotor with water jet cooling systems.⁵

Antiseptic mouthwashes have been widely used as a standard measure before routine dental treatment, especially preoperatively. They have an essential role in reducing the number of microorganisms in the oral cavity. Recent publications have suggested that rinsing the oral cavity may control and reduce the risk of transmission of SARS-CoV-2.⁶ Hence, present review of literature provide details on role of mouthwash in prevention of Covid-19 transmission.

Use of oral antiseptics used against viral infection

Mouthwashes are widely used solutions for rinsing the mouth, especially before oral surgical and periodontal procedure, due to their ability to reduce the number of microorganisms in the oral cavity and colony-forming units in dental aerosols.

Chlorhexidine (CHX)

Chlorhexidine over a period of last 40 years has been thoroughly investigated and successfully used as plaque control agent in dental practice. CHX is a broad-spectrum antiseptic that acts against Gram positive and Gram-negative bacteria, aerobes, facultative anaerobes, and fungus by increasing the permeability of the bacterial cell wall, causing its lysis.

Evidence indicates an in vitro effect against lipid enveloped viruses such as influenza A, parainfluenza, herpes virus, cytomegalovirus, and hepatitis B. Although COVID-19 is an enveloped virus, 0.12% CHX gluconate was suggested to have little or no effect against corona viruses when compared with other mouthwashes.^{7,8} However, Yoon et al. (2020) found SARS-CoV-2 suppression for two hours after using 15 ml 0.12% CHX once, suggesting that its use would be beneficial for the control of COVID-19 transmission.⁹

Povidone - Iodine (PVP-I)

Povidone-iodine is a broad-spectrum antimicrobial mouthwash. It is a water-soluble compound of the iodine and the carrier molecule povidone. On interaction with the tissue, the carrier complex gradually releases free iodine. This steady release helps to reduce tissue irritation, diminishes possible harmful effects, and also maintains its germicidal activity. Povidone-iodine is effective against Gram-positive and Gram-negative bacteria, fungi, and viruses. Its antimicrobial effect is attributed to destabilization of the cell membranes and disruption of certain metabolic pathways.¹⁰

Kawira et al. demonstrated inactivation of SARS-CoV-1 with various PVP-I dilutions from 0.23 to 1% at 2-min exposure time. He concluded that the PVP-I products for gargling and spraying the throat may have a prophylactic effect on SARS during outbreaks.¹¹

Cetylpyridinium chloride (CPC)

Cetylpyridinium Chloride is a broad-spectrum biocide used in dentistry; its main function is to disrupt the lipid layer of the virus membrane. As this agent has the ability to disrupt the lipid envelope, it was suggested that it may be beneficial against other enveloped viruses such as corona viruses.¹²

Hydrogen Peroxide (H₂O₂)

Hydrogen peroxide, a popular bleaching agent used in dentistry produces free radicals of oxygen, which help in lightening of discolored teeth. The antimicrobial action of hydrogen peroxide is also based on the ability of the free radicals to disrupt the microbial lipid membrane.¹³ Hydrogen peroxide has been shown to disrupt lipid membranes through production of oxygen free radicals. A recent systematic review reported that some enveloped viruses, including corona virus, are inactivated by 0.5% hydrogen peroxide.¹⁴

Herbal Mouthwashes

Levy et al (2020) noted that plant polyphenols may help in the therapeutic strategy for the management of SARS-CoV-2 infection.¹⁵ Polyphenols have antiviral, antioxidant, anti-inflammatory, antiobesogenic, antidiabetic, antithrombotic, and prebiotic effects. In addition to polyphenols, plants also contain terpenes and saponins. These substances are present in the essential oils of medicinal plants and are virucidal. Saponins are used as surfactants and natural detergents. Soap also helps to kill coronavirus by destroying the envelope of the virus. Saponins have properties of foaming and because of this, can disrupt the lipid-based envelope of the virus.¹⁶

Triphala

Triphala is a dried powder of three fruits: Indian gooseberry (*Emblica officinalis*), black myrobalan (*Terminalia chebula*) and belleric myrobalan (*Terminalia bellirica*).¹⁷ Srikumar et al. (2007) in a study observed that triphala possesses antibacterial activity against the bacterial isolates (*Klebsiella pneumoniae*) of HIV infected patients. Besides having an excellent antibacterial and antifungal action, triphala has demonstrated antiviral action against HSV-1, cytomegalovirus, and HIV. However, studies have not been conducted to demonstrate its efficacy against any of the human corona virus strains.¹⁸

Thymol containing compounds/essential oils

In an a recent study, it was seen that that biological substrates such as Thymol, Limonene, and Isothymol obtained from the essential oil of the plant *Ammoides verticillata* can obstruct the activity of the ACE-2 as a receptor for SARS-CoV-2. This fact may be suggestive of a possible role of thymol containing mouthwashes in reducing risk transmission during the present SARS-CoV-2 outbreak.¹⁷

Recommendation: Gently gargle for 30 seconds in the oral cavity and 30 seconds in the back of the throat 1.5% or 3% H₂O₂ 15 ml; PVP-I, 0.2%, 0.4%, or 0.5% 9 ml; 0.12% CHX 15 ml or 0.05% CPC 15 ml.

Author/Associations	Recommendation
American Dental Association (2020)	Use 1.5% hydrogen peroxide (commercially available in the US) or 0.2% povidone as a preprocedural mouthrinse. ¹⁹
US Centers for Disease Control (CDC)	Recommended using a mouthwash containing 1.0-1.5% H ₂ O ₂ as a pre-procedural rinse before dental treatment ²⁰
Yoon JG et al. (2020)	0.12% CHX 15 ml for 30 sec ⁹
Mady LJ et al. (2020)	10 mL of 0.5% aqueous PVP-I solution ²¹
World Health Organization	0.2% povidone-iodine or 0.5–1% hydrogen peroxide as an antimicrobial mouth rinse can reduce the load of virus in the oral cavity. ²²

Conclusion: Within the limitations of available literature and clinical evidence, it has been suggested that the use of pre-procedural mouthwashes in dental practice can reduce SARS-CoV-2 viral load and reduce the cross infection risk while treating patients during the Covid-19 pandemic.

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