Journal of Oral Diseases and Treatment

ScitechJournals

Open Access

Povidone-Iodine: A Versatile Antiseptic for Modern Medicine

Abstract

Povidone-iodine is a universally adopted antiseptic solution in the healthcare sector, including both adult and pediatric dentistry, due to its broad-spectrum antimicrobial properties. This article explores the uses, mechanism of action, and limitations of povidone-iodine in dental care settings, with a focus on its role in pre-procedural rinses, infection control, and caries prevention. The mechanisms by which povidone-iodine reduces microbial load and minimizes postoperative infections are discussed. The aim is to provide a cumulative review of the uses of povidone-iodine to achieve optimal oral health and emphasize its effectiveness in daily dental practice.

Keywords

Povidone-Iodine, Orai Antiseptic, Dental Caries, Prevention, Pre-Procedural Mouthwash, Streptococcus mutans, Infection Controi, Ciinicai Practice, Antimicrobial Agent.

Review Article

Tahir Avadia[1]*, Dr Monika Khoja[2], Dr Tanvir Avadia[3], Dr Shamsudin Khoja[4]

[1]4th year bds student at karnavati school of dentistry, Gandhinagar

[2]PhD scholar pediatric and preventive dentistry, Gujrat university Ahmedabad

[3]MBBS DY PATIL university school of medicine, Navi mumbai

[4]MBBS, MS orthopedics surgery musculoskeletal medicine BJMC Ahmedabad

***Correspondence:** 4th year bds student at karnavati school of dentistry, Gandhinagar, Email: tahiravadia007@gmail.com

Received: 17 Nov, 2025; **Accepted:** 11 Dec, 2025; **Published:** 22 Dec, 2025.

Introduction

The oral cavity hosts a complex microbial ecosystem with a high rate of cellular replication. The presence of bacteria in the oral cavity is considered normal, and many types of beneficial oral microflora play an important role in supporting the body's immune system and combating disease-causing microbes that enter the oral cavity. Some commensal organisms release organic acids that help eliminate microorganisms responsible for diseases, particularly those causing intestinal infections. [1]

Poor oral hygiene during or after dental surgery-especially in immunocompromised patients-may lead to the rapid growth of pathogenic bacteria, overwhelming the normal bacterial balance in the oral cavity. This can pose risks ranging from mild local infections to severe and life-threatening bacteremia. [1]

To prevent such occurrences, antiseptic mouthwashes often contain components such as alcohols, quaternary ammonium compounds, chlorhexidine, peroxides, permanganates, iodine-based compounds, fluorides, and quinolone derivatives.

Iodine has long been recognized in the medical field for its potent antimicrobial properties. In aqueous solutions, various forms of elemental iodine exist, with hypoiodous acid and molecular iodine (12) being the most effective against microbes. These reactive iodine species attack pathogens by oxidizing essential components such as proteins, nucleic acids, and cell membranes. [2]

Povidone-iodine (PVP-I) is a preparation widely used not only in dental clinics but also in various healthcare settings. It consists of a complex of the polymer polyvinylpyrrolidone (also called povidone) and elemental iodine. When used as a topical antiseptic, a steady balance is maintained: the iodine used to kill microbes is continuously replenished by more iodine

released from the PVP complex. This mechanism sustains the antiseptic effect for a longer duration while reducing the risk of irritation and cytotoxicity. [3]

Application of PVP-I in Dentistry

(i) Pre-procedural Mouthwash

Most dental procedures produce droplets or aerosols. When rotary instruments like air rotors are used, aerosols are generated [3]. These consist of tiny particles that remain suspended in the air and can be inhaled by the practitioner or others nearby [3]. These aerosols contain microorganisms capable of transmitting infections either through direct contact or via contaminated surfaces. Povidone-iodine helps reduce the number of microorganisms in aerosols, thereby preventing the spread of infection. The use of pre-procedural mouthwash is recommended as a method to reduce microbial load in aerosols. PVP-I was widely used and proved beneficial during the COVID-19 pandemic. Notably, PVP-I oral antiseptics at concentrations of 0.506, 106, and 1.506 have been shown to completely inactivate SARS-CoV-2 within 15 seconds of contact, highlighting their effectiveness in reducing viral load before dental procedures. [3]

(ii) Role of PVP-I in the Prevention of Dental Caries

Prevention of dental caries is multifactorial and involves reducing bacterial load, strengthening enamel, and improving oral hygiene. While fluoride is the primary agent for caries prevention due to its enamel remineralizing properties, complementary methods can enhance this strategy-one such adjunct is povidone-iodine. [3]

Role of Streptococcus mutans and Povidone-Iodine in Caries Prevention

Streptococcus mutans is a key pathogen in the development of dental caries due to its strong acid production and acid tolerance. These traits enable it to thrive in an acidic environment, leading to enamel demineralization. As the primary microorganism associated with early childhood caries (ECC), [4] controlling S. mutans is central to caries prevention.

Incorporating PVP-I into Caries Prevention Strategies

a. Professional Application in Pediatric Patients:

Povidone-iodine is especially beneficial for children at high risk for ECC. Clinical protocols may include applying a 1006 povidone-iodine solution on tooth surfaces after oral prophylaxis to reduce total bacterial counts, including S. mutans. Clinical studies show that both experimental and control groups receiving PVP-I treatments demonstrate a reduction in S. mutans and overall bacterial counts. [5]

b. Adjunct to Fluoride Varnish:

PVP-I can be applied before fluoride varnish in high-risk patients. It reduces bacterial load, thereby allowing the fluoride to adhere and penetrate more effectively. [6]

c. Application in Patients with Xerostomia:

Reduced salivary flow in xerostomia impairs protective oral functions, increasing caries risk. Povidone-iodine's antimicrobial action can help control bacterial growth, reducing the likelihood of decay. [7]

(iii) Skin Preparation in Oral Surgery

a. Pre-incision Skin Preparation:

Before making an incision, the surgical site is usually disinfected using a commercial antiseptic like Betadine, DuraPrep, or ChIoraPrep. [7]

b. Intra-Operative Protocol for Extraction Sites:

After an extraction, it is standard protocol to clean the socket and adjacent tissues of debris. To maintain a sterile environment-especially in traumatic cases like tooth avulsion-povidone-iodine is commonly used. PVP solutions are routinely utilized in both pediatric and adult patients to support tissue health and prevent infection. [7]

c. Post-Operative Rinsing:

Postoperative care often includes medicated rinses to keep the area clean. These rinses help eliminate debris, reduce microorganisms, and promote healing. [8] PVP-I rinses are recommended for their broad antiseptic action and tissue compatibility.

Possible Side Efiects of PVP-I:

PVP-I may cause an intense reaction in a few cases. These reactions may include:

- Allergic reaction-Trouble breathing, swelling of lips, tongue, face, or throat. [8]
- Skin irritation-Burning or redness. [9]
- Thyroid effects-Topical application of povidone-iodine has been known to cause transient hypothyroidism in newborns as a result of iodine excess. [10]
- Temporary discoloration-PVP-I, when applied to the tooth surface and left for a longer period, may temporarily stain it. [7]

Conclusion

PVP-I is a well-established, broad-spectrum antiseptic known for its effectiveness against a wide range of oral pathogens. Its use is especially warranted in surgical dentistry and in patients at high risk for bacteremia. When combined with antibiotics, PVP-I may enhance therapeutic outcomes, as systemic antibiotics may not always adequately reach localized oral infections.

Socket irrigation with PVP-I is an effective, inexpensive, and well-tolerated method to minimize postoperative complications following surgical extractions. Nevertheless, further research is needed to determine specific clinical conditions and treatment protocols in which PVP-I provides maximum benefit.

References

1. Amtha, Rahmi, and Jeeve Kanagalingam. “Povidone-iodine in dental and oral health: a narrative review.” Journal of International Oral Health 12, no. 5 (2020): 407-412.
2. McDonnell, Gerald, and A. Denver Russell. “Antiseptics and disinfectants: activity, action, and resistance.” Clinical microbiology reviews 12, no. 1 (1999): 147-179.
3. Bidra, Avinash S., Jesse S. Pelletier, Jonna B. Westover, Samantha Frank, Seth M. Brown, and Belachew Tessema. “Rapid in-vitro inactivation of severe acute respiratory syndrome coronavirus 2 (SARS□CoV□2) using povidone□iodine oral antiseptic rinse.” Jour- nal of Prosthodontics 29, no. 6 (2020): 529-533.
4. Zhang, Yixin, Jiakun Fang, Jingyi Yang, Xiaolei Gao, Liying Dong, Xuan Zheng, Liangjie Sun et al. “Streptococcus mutans-associated bacteria in dental plaque of severe early childhood caries.” Journal of oral microbiology 14, no. 1 (2022): 2046309.
5. Milgrom, P., O. Tut, M. Rothen, L. Mancl, M. Gallen, and J. M. Tanzer. “Addition of povidone-iodine to fluoride varnish for dental caries: a randomized clinical trial.” JDR Clinical & Translational Research 6, no. 2 (2021): 195-204.
6. Simratvir, Mauli, Namita Singh, Saroj Chopra, and Abi Thomas. “Efficacy of 10% povidone iodine in children affected with early childhood caries: an in vivo study.” Journal of Clinical Pediatric Dentistry 34, no. 3 (2010): 233-238.
7. Simratvir, Mauli, Namita Singh, Saroj Chopra, and Abi Thomas. “Efficacy of 10% povidone iodine in children affected with early childhood caries: an in vivo study.” Journal of Clinical Pediatric Dentistry 34, no. 3 (2010): 233-238.
8. Nair, Smriti, Aretha Zhu, Mustafa Jaffry, Hassaam Choudhry, and Mohammad H. Dastjerdi. “Povidone-iodine adverse effects and alternatives for ocular procedures.” Journal of Ocular Pharmacology and Therapeutics 39, no. 3 (2023): 207-214.
9. Uses, Remdesivir. “Side Effects & Warnings. Drugs. com.” Com. Available online: https://www. drugs. com/mtm/ remdesivir. html (accessed on 1 March 2023) (2020).
10. Petri, A. R., and M. Pietsch. “Povidone-iodine to prevent ophthalmia neonatorum.” The New England journal of medicine 333, no. 2 (1995): 126-127.

Citation: Tahir Avadia, Dr Monika khoja, Dr Tanvir Avadia, & Dr Shamsudin Khoja. “Povidone-Iodine: A Versatile Antiseptic for Modern Medicine.” J Oral Dis Treat (2025):109. DOI: 10.59462/JODT.2.1.109