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Letter to the editor

The role of povidone-iodine in managing of SARS-CoV-2 pandemic



Currently, the worldwide management of severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2) is mainly based on vaccination coverage and prevention strategies such as medical masks, social distancing, hand sanitizers, and telemedicine. SARS-CoV-2 can be transmitted in the upper respiratory tract, i.e., the nasal and oral cavities. Since vaccination coverage is not the same globally and the virus has high mutation potential and evades the vaccine, primary disinfection in the nasal and oral cavity is highly considered in reducing the viral load of COVID-19. In this regard, preliminary povidone-iodine (PVP-I) data have shown satisfactory results in eliminating the virus.^{1–3} Hence, this brief letter attempts to highlight the efficacy of PVP-I against SARS-CoV-2.

PVP-I is a complex of three elements, namely povidone, hydrogen iodide, and elemental iodine. After releasing free iodine (I₂) from PVP-I (C₆H₉I₂NO), I₂ can penetrate the microorganisms, thereby destroying two of their main components (i.e., proteins and oxidized nucleic acid) and resulting in an antimicrobial effect. PVP-I is used as an antiseptic against microorganisms such as gram-positive and gram-negative bacteria, fungus, and viruses (i.e., herpes, rubella, mumps, and respiratory viruses). As a pre-surgical skin antiseptic, it acts rapidly after being applied to the skin. It is also used as an oral and nasal antiseptic to deal with mucositis and oropharyngeal infections and prevent respiratory diseases related to pneumonia.^{3,4}

The following recent studies have compared the effectiveness of PVP-I with other mouthwashes against COVID-19. In a comprehensive systematic review of 23 studies, Silva et al. showed that PVP-I significantly reduced the viral load of SARS-CoV-2 compared to other mouthwashes. The result also demonstrated the lower virucidal properties of chlorhexidine (CHX) and hydrogen peroxide (H₂O₂) than cetylpyridinium chloride (CPC).⁵ In another study, Elzein et al. evaluated the effectiveness of two types of mouthwash, namely 0.2% CHX and 1% PVP-I in 27 and 25 patients, respectively, against SARS-CoV-2. Although the number of participants with PVP-I compared to CHX was not the same,

the cycle threshold (Ct) values of both types of mouthwash were significantly increased after gargling, suggesting the higher effectiveness of PVP-I against SARS-CoV-2.⁶

PVP-I in a concentration of 0.23% has a high virucidal efficacy (i.e., 99.99%) against all viruses, and its effectiveness has been proven in vitro. PVP-I, as a protective layer or coating over the nasal and oral mucosa, can prevent the binding of SARS-CoV-2 spike protein to the ACE-2 receptor. Hence, PVP-I can destroy the transmission of SARS-CoV-2, making it suitable as an oro-nasal spray. Accordingly, PVP-I can be considered as an effective defense for medical workers.⁷

In addition, Seikai et al. assessed the changes in SARS-CoV-2 viral RNA copies (log₁₀ copies/mL) and viral titer (log₁₀ TCID₅₀/mL) before and after gargling with PVP-I (diluted 15 times with water) in 11 patients who tested positive for COVID-19. The results showed a significant reduction in viral RNA immediately, 30 min, and 60 min after gargling with PVP-I and in viral titer immediately and 60 min after gargling. Although the reduction in viral titer after 30 min of gargling was not statistically significant, the median value of SARS-CoV-2 was decreased compared to before gargling. Thus, PVP-I is a mouthwash with a high potential to reduce the viral load of SARS-CoV-2.⁸

Based on the existing evidence in the literature concerning PVP-I, the following two major points have been mentioned about this oral solution and nasal spray: First, PVP-I as an oral mouthwash or nasal spray is recommended to use every 2 or 3 h, up to 4 times daily in the cases of positive or suspected COVID-19 patients. Second, health-care providers before and after contact with patients who have tested positive or are suspected of having COVID-19 should apply PVP-I oral solution and nasal spray every 2 or 3 h, up to 4 times daily. Also, the research has shown that the PVP-I concentration of up to 1.25% is safe in the oral and nasal cavities. For example, a nasal spray at a concentration of 0.5% PVP-I can be used at a dose of 0.3 ml in each nostril, and a 10 ml oral solution of 1% PVP-I can be gargled for 30 s.⁴

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Gou et al. measured iodine levels of PVP-I in blood and urine, as well as thyroxine levels in blood before and after oral surgery, during which the oral cavity was irrigated with PVP-I in 24 healthy male patients. The results revealed that oral transmucosal absorption of iodine in blood and urine was increased after oral surgery compared to before the operation, posing a risk to patient safety. No change was observed in the thyroxine levels in the blood. Overall, oral surgery can be considered as an intervention factor that can increase the oral mucosal absorption rate of PVP-I's iodine, and the absence of female patients in the study can be highlighted. Therefore, the results cannot be generalized to individuals with healthy oral conditions.⁹

In another study, Panchmatia et al. assessed the efficacy of PVP-I in dealing with recalcitrant chronic rhinosinusitis (CRS). For this purpose, 29 patients with endoscopic signs of persistent inflammation and purulent discharge were irrigated with 0.08% PVP-I. The result showed that PVP-I is a safe solution that significantly reduces endoscopic signs of infection and sinonasal bacterial growth without affecting thyroid function, mucociliary clearance, or olfactory sense.¹⁰ PVP-I can also be considered as an antiseptic solution for routine use during the management of COVID-19 patients, particularly in the case of intubation, endoscopy, and bronchoscopy.²

Based on the foregoing information in this letter, the use of PVP-I as nasal and oral antiseptics has a high potential for combating SARS-CoV-2 during the pandemic. Likewise, along with other factors, including vaccination, telemedicine, medical masks, social distancing, and hand disinfection, a special emphasis should be placed on the importance of PVP-I and the prevention of COVID-19.

Declaration of competing interest

There is no conflict of interest.

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