Review Article

Use of povidone as a mouthrinse to decrease the viral load of Covid-19 before dental care: Review of the literature

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Abstract: Purpose: To review the literature on the use of povidone prior to dental treatment for the reduction of viruses in the oral cavity. **Methods:** PubMed and Cochrane databases published from January 2019 to June 2020 were reviewed. Studies that met the inclusion criteria were reviewed by two authors separately. A qualitative review of the data was performed. **Results:** There were no randomized controlled trials or clinical observation studies on the curative or preventive effect of povidone against COVID-19, but there are clinical trial protocols in the recruitment process. The use of a dose between 0.2% to 2.5% is recommended four times a day for 15-30 seconds. (*Am J Dent* 2020;33:248-250).

Clinical significance: Povidone mouthwash could be a viable solution before dental care that should be studied to reduce the viral load off COVID-19.

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Introduction

As viral load appears highest in the nasopharynx, and high in human saliva, these anatomical areas likely seed the lower airway and serve as one of the main reservoirs for aerosolized transmission and progression of pulmonary disease. Furthermore, viral loads of asymptomatic and symptomatic patients are similar, suggesting the transmission potential of asymptomatic/minimally symptomatic patients.[1]

The use of antiseptic rinses prior to dental care would favor the reduction of the virus in the oral cavity. Various biocidal agents can inactivate SARS-CoV and MERS-CoV effectively; these are ethanol (ethyl alcohol) 78-95% for 30 seconds, 2-propanol (isopropyl alcohol) 70-100% for 30 seconds, formaldehyde 0.7-1% for 2 minutes, povidone iodine 0.23-7.5% for 1 minute. Glutaraldehyde 2.5% for 5 minutes or 0.5% for 2 minutes inactivates SARS-CoV, but no study has been published with MERS-CoV. Sodium hypochlorite requires a minimum concentration of 0.21% for 30 seconds to be effective, and hydrogen peroxide at a concentration of 0.5% requires 1 minute, although these results were with other coronaviruses and not MERS-CoV or SARS-CoV. The WHO recommends using 0.5% sodium hypochlorite or 70% ethyl alcohol for at least 1 minute. It has also been recommended to study the preventive effects of therapeutic oral biofilm rinses with βCD-Citrox to reduce the viral load of the infection and possibly the progression of the disease.[2]

Since SARS-CoV-2 is vulnerable to oxidation, the use of 0.5% H_2O_2 or 0.2% PVP-I as gargle/mouthrinse may minimize the risk of SARS-CoV-2 transmission.[3] Chlorhexidine rinses do not appear to be effective in killing the virus.[4]

Approaches to nasal and oral decontamination with povidone-iodine (PVP-I), reduce nosocomial spread of Severe Acute Respiratory Syndrome-Coronavirus 2 (SARS-CoV-2).[5] Povidone iodine 2-minute treatment reduces viral infectivity to below a detectable level in SARS-CoV and the efficiency of povidone iodine was similar to 70% ethanol in terms of reducing viral infectivity.[6]

Therefore, the present study reviewed the use of povidone-containing oral rinse to reduce the pre-dental viral load.

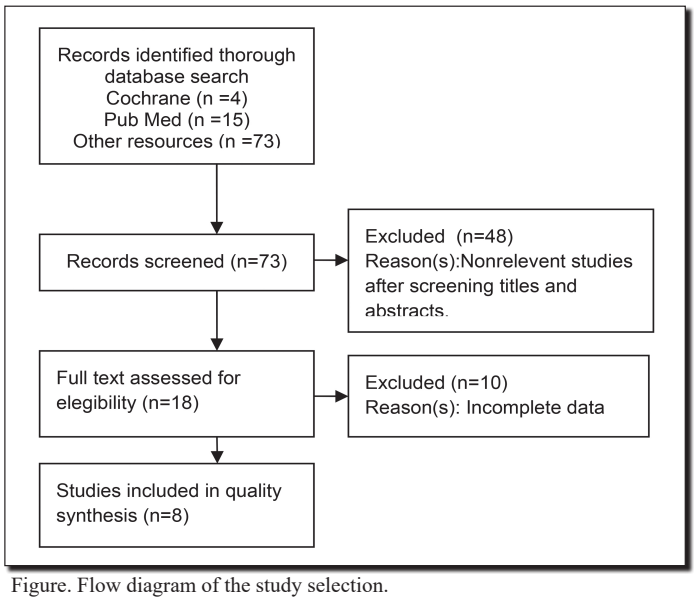

Figure. Flow diagram of the study selection.

Materials and Methods

The PubMed and Cochrane databases were reviewed. Articles published between the years 2019 to 2020 were evaluated. The search terms used were: COVID-19, povidone, mouthwash, and viral load. A qualitative review of the data was performed.

Studies that met the inclusion criteria (clinical trials, prospective studies, and observational studies) were reviewed by two authors individually. Studies that did not meet methodological quality were excluded. Data were extracted, by first author, year of publication, type of study, povidone dose and time of use.

Results

The search revealed 19 studies, which after filtering left 15 studies for qualitative synthesis (Figure).

No clinical trials were found, but they were in the recruitment stage, so the protocols were presented (Table 1).

Regarding the use of povidone, the use of a dose between 0.2% to 2.5% was recommended four times a day (Table 2).

Table 1. Protocols of clinical trials published (n = 4).

Author	Year	Type of study	Interventions
Rickert[8] NCT04341688	2020	RCT	Drug: Saline oral/nasal rinse. Drug: 0.5% povidone/iodine oral/nasal rinse. Drug: 0.12% chlorhexidine oral/nasal rinse.
Nayak[9] NCT04344236	2020	RCT	Drug: Povidone-iodine 2%. Drug: Povidone-iodine 0.5%. Drug: Isotonic saline 0.9%.
Mimoz[10] NCT04371965	2020	RCT	1% Povidone iodine mouthwash (95 mL), gargle, and nasal spray (2.5 mL by nostril), and 10% nasal gel (one drop).
Syed[7] NCT04341688	2020	RCT	Group A (n=10) 10 ml gargle and nasal lavage using 0.2% povidone-iodine (Betadiene). Group B (n=10) 10 ml gargle and nasal lavage using 1% hydrogen peroxide (ActiveOxy). Group C (n=10) 10 ml gargle and nasal lavage using neem extract solution (*Azardirachta indica*) formulated locally). Group D (n=10) 2% hypertonic saline (Plabottle). Group E (n=10) distilled water gargles.

Table 2. Recommended dosage and time on the use of povidone as a mouthrinse to reduce the viral load of COVID-19 (n = 5).

Author	Year	Duration	Dose
Rickert[8] NCT04341688	2020	4 times a day, for 7 days	0.5%
Nayak[9] NCT04344236	2020	4 times a day, for 5 days	2% & 0.5%
Mimoz[10] NCT04371965	2020	4 times a day, for 5 days	1%
Syed[7] NCT04341688	2020	20-30 seconds, twice daily for 6 days.	0.2%
Mady[1]	2020	4 times a day	0.4%

Discussion

There is no clinical evidence regarding the use of povidone to reduce the viral load of COVID-19, but four registered clinical trials[7-10] were included.

PVP-I formulations were shown to inactivate SARS-CoV-2 virus efficiently. Nasal formulation may potentially be used to inactivate SARS-CoV-2 virus in the nasal cavity thereby preventing infection of the airways.[11] Povidone-iodine can safely be used in the nose at concentrations up to 1.25% and in the mouth at concentrations up to 2.5% for up to 5 months. Povidone-iodine rapidly inactivates coronaviruses, including SARS and MERS, when applied for as little as 15 seconds.[5] To minimize toxicity when using PVP-I as a repeated application, most protocols recommend concentrations of PVP-I between 0.2% and 0.5%. Another study[12] recommended to decolonize patients using preprocedural chlorhexidine wipes, two doses of nasal povidone-iodine within 1 hour of incision, and chlorhexidine mouthrinse.

PVP-I solutions ranging from 0.23% to 7% have demonstrated highly effective virucidal activity against a broad range of viruses including several coronaviruses responsible for recent epidemics including SARS-CoV-1 and MERS-CoV.[13] Additionally, 1% PVP-I solution was well-tolerated as a sinus irrigation and may represent a feasible method for temporarily disinfecting the sino-nasal cavity of bacteria and viruses such as COVID-19.[14]

PVP-I oral antiseptics, at all tested concentrations of 0.5%, 1%, and 1.5%, completely inactivated SARS-CoV-2 within 15 seconds of contact. The 70% ethanol control group was unable to completely inactivate SARS-CoV-2 after 15 seconds of contact but was able to inactivate the virus at 30 seconds of contact.[15]

Some disadvantages of the PVP-I oral solutions include the absence of clinical research such as randomized clinical trials, and the current absence of commercially available formulations at lower concentrations for intra-oral use. In the absence of appropriate commercially available preparations for routine dental use, dilution of the commercially available 10% povidone iodine by 1:20 utilizing 0.5 cc of 10% povidone iodine and 9.5 cc of sterile saline or sterile water for routine clinical use is recommended.[16] However, dentists should make freshly diluted solutions each day and refrigerate them during the day as diluted PVP-I solutions are chemically unstable if the proportion is not correct.[15]

Even though only two respected databases (Cochrane and PubMED) were searched in this review, further studies including more databases should be performed.

Conclusion

Povidone mouthwash could be a viable solution before dental care that should be studied to reduce the viral load of COVID-19. Clinical studies are needed to confirm this.

Disclosure statement: The authors declared no conflict of interest.

Dr. Mendez is a Researcher, Regional Institute of Health Research, and Dr. Villasanti is Vice Chancellor, National University of Caaguazú, Coronel Oviedo, Paraguay.

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