

Anti-COVID Nasal Spray and Gargles used to Prevent COVID-19.

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Abstract

To prevent SARS-COV-2, all available hygienic measures must be implemented, especially to protect the workers, but also the community. Most infected people were died in the pandemic situation. Many clinical trials and studies are in process to prevent the progression and rapidly ongoing clinical trials that are investigating the anti-covid nasal spray and gargles for prevention from infection.

Many studies suggest that anti-covid nasal sprays and Gargles have more effective for the prevention against the SARS-COV-2. Anti-covid nasal sprays and gargles are with antiviral properties. A number of commonly used anti-covid nasal spray including "Invisi Mask, Nitric oxide Nasal spray (NONS), Povidone-iodine Nasal spray (PVP-I), Taffix spray". And gargles including "Povidone-iodine gargle (PVP-I), Betadine gargle, 'Nozin', Chlorhexidine gargle, hydrogen-peroxide gargle, dequonal, dequalinium chloride and Benzalkonium chloride independently with antiviral and virus, Cetylpyridinium chloride, C31 G". These should be studied in clinical trials to reduction of both the progression and transmission of SARS-COV-2.

Keywords

Covid-19, SARS-COV-2, Coronavirus, Anti-covid nasal sprays, Gargles, Mechanism

Abbreviations

SARS-COV-2: Severe Acute Respiratory Syndrome Coronavirus-2; PPE: Personal Protective Equipment; PVP-I: Povidone-iodine; NONS: Nitric Oxide Nasal Spray; H₂O₂ gargle: Hydrogen-peroxide gargle; URTI: Upper Respiratory Tract Infections

Introduction

The sudden onset, outbreak and pandemic of Covid-19 began in late 2019, causing widespread problems and concerns [1]. Covid-19 belongs to the coronavirus family, SARS-COV-2 (Severe Acute Respiratory Syndrome Coronavirus-2) and MERS-coV viruses (Middle East Respiratory Syndrome Coronavirus), which have spread in recent years but are less widespread and less contagious than covid-19, also belong to this family, only α and β family Coronavirus can infect humans and SARS-COV-2, MERS-COV and COVID-19 belong to β family Coronavirus [2]. Previous researches also show that more than 80% of the COVID-19 genome resembles that of the SARS-CoV [3]. The very rapid spread of the Covid-19 virus in a very short time shows the very high transmission potential of this disease [4,5]. Human to Human transmission of COVID-19 occurs due to close contact with an infected person exposure to coughing, sneezing, breathing drops or airborne particles [6].

Last year almost millions of people have been infected and many were died. Patients may have an illness with symptoms varying from mild to very severe. Not all those who have the condition are tested for the presence of virus. No vaccine has

been developed nor have any therapeutic agents been shown to be effective. **Management** options are largely supportive. Many efforts have focused on prevention using measure of social distancing and isolation [7]. Many studies developed the vaccines for prevention of COVID-19. The Anti-covid vaccines have many side effects. To prevention of COVID-19 infections many clinical trials and studies are in the process. In that ongoing clinical trials are investigating the anti-covid nasal spray and Gargles for prevention [8].

Gargles have oral rinsing solutions that are in common use to manage halitosis, prevent tooth decay and reduce plaque formation. In some countries, they are recommended as a hygiene measure during the regular cold and flu season. The antiviral agents and effectiveness vary and whilst most have some viral properties a few are also antimicrobial. Due to gargles antiviral property, it is used in prevention measure of COVID-19 [8].

There has been considerable interest in the use of nasal irrigation or oral rinses to prevent transmission of Upper Respiratory Tract **Infections** (URTI) caused by viruses, or to alleviate their symptoms. Transmission of such disease occurs by the inhalation of small droplets containing viral particles, or by direct transfer (for example from surfaces, to hands, and then to the face, mouth and nose). Rinsing the mouth and/or nose may eradicate viral particles completely preventing transmission to that individual or reduce the viral load that the individual is exposed to. This may prevent the disease developing in that individual or reduce the severity of it. Gargles that have been investigated for their ability to reduce viral transmission, include tea (or components of tea) [9], water [10] and povidone iodine [11,12]. Other mouthwashes in common use, including hydrogen peroxide and chlorhexidine, may also have antiviral activity [13].

Given the new emergence of COVID-19, the efficacy of nasal or oral irrigation fluids against this disease is not yet known. However, activity against similar novel corona viruses (such as those responsible for severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS)) has been demonstrated for some preparations [14,15]. Gargle solutions of povidone iodine have been shown to be active against the corona viruses causing both MERS and SARS in vitro [15,16].

What is SARS-COV-2?

SARS-COV-2 (Severe Acute Respiratory Syndrome Coronavirus-2) is an infectious disease caused by a newly discovered corona virus. It was first isolated from three people with **Pneumonia** connected to the cluster of acute respiratory illness cases in Wuhan. All structural features of the novel SARS-COV-2 virus particle occur in related corona viruses in nature. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease and cancer are more likely to develop serious illness [17].

What is Anti-covid Nasal Spray?

The Anti-covid nasal spray is an investigational dialy human antibody nasal spray designed to neutralize SARS-COV-2 the virus that causes COVID-19, from airborne droplets and particles in the nasal cavity, the primary entry point of SARS-COV-2 infection. At the lowest dose of 25 mg, the antibodies provided at least 10 hours of protection against infection in mice exposed to the highest viral load tested (10^7 virus particles administered intra nasally) [18]. We envision the anti-covid nasal spray to be used daily to provide an important line of personal protection against SARS-COV-2 infection [19].

What is Anti-covid Gargle?

We investigated the in-vitro virucidal efficacy of gargle at defined dilution against oral and respiratory tract pathogens. The novel Coronavirus can be inactivated using commercially available mouthwashes, according to a study which says gargling with those products may reduce the quantities of viral particles in the mouth and throat and possible reduce the risk of COVID-19 transmission over the short term.

How Do You Use Nasal Sprays?

The first thing you need to do is to blow your nose to clear up the passageways as much as you can. Then take the cap off the bottle and follow the directions for shaking or "priming" the pump, if necessary. Now take these steps:

- Block one nostril by pressing a finger against it lightly.
- Put your thumb at the bottom of the pump bottle. The hole at the top of the bottle should be underneath your open nostril.
- Squeeze the pump and breathe in gently. Then switch to the other side and repeat the process.
- When you're done, don't blow your nose right away and try not to sneeze. That will keep the medication in your nose.
- Some sprays may have different instructions on the label, so use those or follow your doctor's directions.
- Don't use it for longer than recommended by your doctor or the maker of the nasal spray [16].

How Does the Anti-covid Nasal Spray Work?

The Eureka antibodies (In anti-covid Nasal spray) function by binding to the S1 spike protein of SARS-COV-2 and preventing the virus from binding to the ACE-2 (Angiotensin converting enzyme-2) receptor on cells in the upper respiratory system [19]. This blocks SARS-COV-2 from entering cells and triggering on infection [20].

Mechanism: We envision the anti-covid nasal spray to be used daily to provide an important line of personal protection against SARS-COV-2 infection (Figures 1 and 2) [19].



FIG.1. Administration by Anti-covid nasal spray.

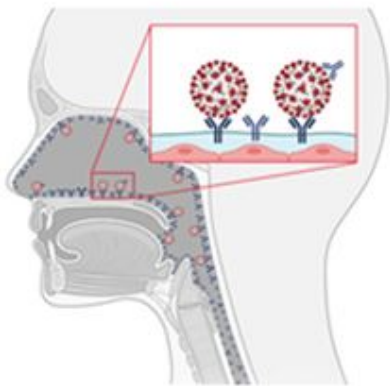


FIG. 2. Antibodies adhere to the upper respiratory tract. Antibodies neutralize the SARS-COV-2 virus.

Who Should Not Use Nasal Sprays?

- A lot of over-the-counter decongestants, including these sprays, aren't recommended for children. Read the labels carefully and talk to your pediatrician.
- You might want to avoid some nasal sprays if you have high blood pressure, a heart condition, diabetes, thyroid problems, or urinary problems from an enlarged prostate.
- Decongestant products, including nasal sprays, can raise blood pressure and pulse rate. They can also cause you to feel nervous or dizzy, or make it hard for you to get to sleep (Figure 3).



FIG. 3. Some decongestants.

- Some decongestants may interfere with other medications you take. Check with your doctor before you use them.
- **Steroid** nasal sprays can cause nosebleeds and, although rarely, a change in your sense of smell [20-22].

Advantages:

1. Low cost and ease for personal administration.
2. Provides at least 10 hours of protection in mice exposed to the highest viral load tested.
3. Use as an additional means of protection against infection, for high risk individuals and in situations in which face Mask wearing is impractical.
4. Storage at room temperature with long shelf life in comparison to vaccines will simplify distribution and expand access.
5. Complement to vaccines, therapeutics and other preventive measures such as face masks in showing spread of COVID-19.
6. Antibodies provide active protection in neutralizing the SARS-COV-2 virus.
7. IgG antibody manufacturing process is well established and versatile for large scale protection.
8. Human antibody reduces risk of immune response to nasal spray made with foreign peptides or non-human originated antibodies.
9. Provides potent neutralization of SARS-COV-2 virus at low doses.
10. Low risk of cross reactivity with non-spike protein targets.
11. Increases the retention time of the antibody on respiratory mucosal surfaces and extends the duration of protection against infection [19].

Gargles

The study published in the Journal of infectious diseases, cautions that mouthwash are not suitable for treating COVID-19 infections or protecting oneself against catching the novel Coronavirus, SARS-COV-2 according to the researchers including those from Ruhr University Bochum in Germany, high quantities of the virus particles or viral load can be detected in the oral cavity and throat of some COVID-19 patients [18].

They added that the main route of transmission of virus likely involves direct contact with respiratory droplets of infected individuals produced during sneezing, coughing or talking and the subsequent contact to nasal, oral or ocular mucosal membranes of healthy individuals [23-26].

The researchers believe the study's finding might help reduce the risk of this form of transmission and potentially help develop protocols for dental treatment. They said the findings support the idea that oral rinsing might reduce the viral load of saliva and could thus lower the transmission of SARS-COV-2.

“Our findings clearly advocate the evaluation of selected formulations in clinical context to systematically evaluate the decontamination and tissue health of oral cavity in patients and healthcare workers to potentially prevent virus transmission”

the scientists wrote in the study. In the research, they tested eight mouthwashes with different ingredients that are available in pharmacies in Germany [27].

“Gargling with a mouthwash cannot inhibit the production of viruses in the cells, but could reduce the viral load in the short term where greatest potential for infection comes from, namely in the oral cavity and throat. And this could be useful in certain situations, such as at the dentist or during the medical care of COVID-19 patients” explained study co-author Toni Meister from Ruhr University Bochum [28].

Other small studies have suggested potential beneficial anti-viral activity of gargling with green tea or solutions containing catechins, active ingredients of green tea, or with apple cider vinegar. These studies, however, were done in the laboratory, so have unknown clinical relevance for patients, and none looked at coronavirus specifically. One study even suggested that gargling with tap water alone may even be helpful in reducing the incidence of upper respiratory infections in a healthy population, although a later study did not confirm this finding [25].

Over all, looking at gargling from a risk-benefit ratio perspective, there seems to be little downside to frequent gargling. It's a low-cost intervention, and may help to treat a sore throat. Whether gargling will actually fight off colds or flu, however, let alone the more serious coronavirus that is currently circulating, remains indeterminate as the current evidence base is limited [25].

Recommendation For the Community

Gargling

- Table salt: dissolve one level teaspoon of table salt in 100 ml of lukewarm water. Put about a shot glass (glass of brandy) in your mouth, interrupt gargling before inhalation and repeat the process for about 3 minutes; at least 3 times/d in the morning and evening, if possible; do not swallow the gargle solution.
- Green tea: cool lukewarm to gargle.
- Pomegranate and aronia juice: since only in vitro results are available so far, saline solution and green tea are to be preferred.
- Essential oils: mouthwashes used undiluted. Mouthwashes based on essential oils are preferable to the above options because of its high in vitro effectiveness against SARS-CoV-2 in terms of reducing the viral load in people infected with SARS-CoV-2. There are no known long-term side effects. For children, people with alcohol intolerance and people with particular mucous membrane sensitivity, the formulation without alcohol (Listerine Cool Mint mild flavor) should be used instead of the combination of essential oils with alcohol (Listerine Cool Mint)[23].

Nasal spray

- Table salt: products without the addition of preservatives or decongestants (e.g., HysanSalinspray or Rinupret) or home-made (see above); application: absorb into the nose by inhalation.
- Carragelose: (AlgovirCold Spray) to be preferred because of its higher effectiveness compared to table salt [23].

How Does the Anti-covid Gargle Works?

Mechanism

The angiotensin-converting enzyme 2 (ACE-2) receptor of the epithelial cells of salivary glands is primary target of the COVID-19 virus. This receptor is abundant in the tongue, indicating a high probability of infection in the oral cavity [2].

Gargle functions as an antiseptic through several mechanisms and is considered to have the broadest spectrum of action (Figure 4). The two most potent antiseptic metabolites of gargles are molecular I₂ and hypoiodous acid, which deliver free iodine. These free iodine molecules oxidize amino acids, nucleic acids and cell membranes. Through oxidation of cell surface receptors, gargles prevents the attachment of viruses to cellular receptors. The virus are present in the oral cavity and they rinsed by the gargling. They have big role in the prevention of viral infection [27].

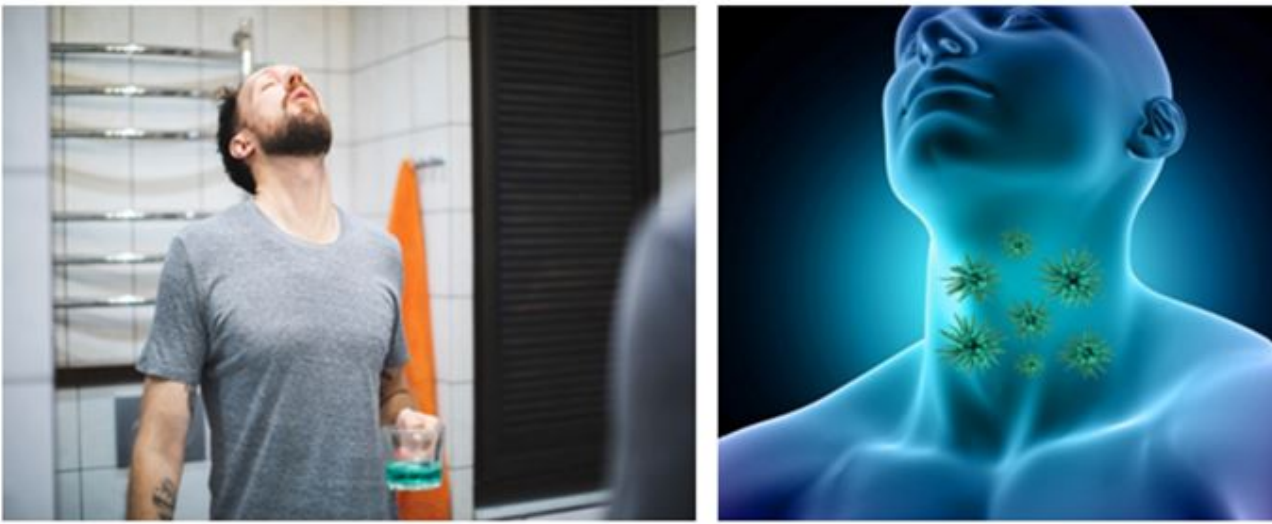


FIG.4. Gargling.

Advantages

1. Gargles can boost the oral health.
2. It may prevent plaque from building up.
3. Rinses with nitric oxide it relaxes the trachea and bronchioles.
4. It eliminates the virus from oral cavity.
5. Reduces the viral load in the short term.
6. Reduces the risk of this form of transmission.
7. It dilutes pathogens present in the oral tract.
8. It's a low-cost intervention, and may help to treat a sore throat.
9. Whether gargling will actually fight off colds or flu, however, let alone the more serious coronavirus that is currently circulating, remains indeterminate as the current evidence base is limited.

Side effects of nasal spray

- Temporary burning, stinging, dryness in the nose, runny nose, and sneezing may occur. If any of these effects persist or worsen, tell your doctor or pharmacist promptly.
- If your doctor has prescribed this medication, remember that he or she has judged that the benefit to you is greater than the risk of side effects. Many people using this medication do not have serious side effects.
- Tell your doctor right away if any of these unlikely but serious side effects occur: slow/fast/pounding heartbeat, dizziness, nausea, headache, mental/mood changes, trouble sleeping, shaking (tremors), unusual sweating, unusual weakness.
- A very serious allergic reaction to this drug is rare. However, seek immediate medical attention if you notice any symptoms of a serious allergic reaction, including: rash, itching/swelling (especially of the face/tongue/throat), severe dizziness, trouble breathing.
- This is not a complete list of possible side effects. If you notice other effects not listed above, contact your doctor or pharmacist [20,22].

Precautions to be taken during the use of nasal spray

- Before using this nasal decongestant, tell your doctor or pharmacist if you are allergic to it; or to other sympathomimetics (e.g., pseudoephedrine); or if you have any other allergies. This product may contain inactive ingredients, which can cause allergic reactions or other problems. Talk to your pharmacist for more details.
- If you have any of the following health problems, consult your doctor or pharmacist before using this product: heart/blood vessel disease, overactive thyroid (hyperthyroidism), diabetes, high blood pressure, difficulty urinating

(due to enlarged prostate).

- Before having surgery, tell your doctor or dentist that you are using this medication.
- Caution is advised when using this drug in children because they may be more sensitive to the effects of the drug. Check the product package or consult with your doctor or pharmacist about whether this nasal spray can be used in children.
- During pregnancy, this medication should be used only when clearly needed. Discuss the risks and benefits with your doctor [21,22].

Conclusion

While nasal sprays and gargles cannot replace the use of traditional personal protective equipment (i.e., gowns, masks, protective eyewear and gloves), the use of nasal and oral antiseptics has the potential to be useful for combating SARS-CoV-2. Clinical trials currently underway will be the best mechanism to determine the true benefit of these compounds and their role in mitigating disease progress and transmission of SARS-CoV-2 infection.

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