REVIEW

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Nasal rinse and gargling as an effort in preventing COVID-19 infection with Islamic approach-a literature review

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ABSTRACT

Due to the COVID-19 pandemic, the general public must comply with health protocols and adopt new habits as this disease spreads through droplets and enters the respiratory tract through the nose and mouth. Meanwhile, water penetration into the nasal cavity (*istinsyaq*) and out (*istintsar*) during ablution corresponds to the nasal rinse and gargling methods, which prevents the mechanical and chemical attachment of viruses. This article discusses the role of Islamic-based nasal rinse and gargling in the prevention of COVID-19 infection.

Various solutions such as plain water, saline, povidone-iodine, and antiseptics have chemical effects. Gargling and nasal rinse mechanically and chemically wash the mucosal surface in the mouth and nose to prevent the attachment of virus and other pathogens. Mechanically, the difference in concentration causes water to move outside the cell by osmosis, reducing mucus secretion and releasing the virus. Meanwhile, a chemical mechanism occurs when the free iodine in povidone-iodine oxidizes fatty acids and damages the virus cell walls and the respiratory chain of cytosolic enzymes, hence preventing inflammation of the host cell. However, the choice of liquid type, concentration, duration, and frequency of use still need to be considered to prevent side effects.

Keywords: COVID-19, Gargling, Islamic, Nasal Rinse.
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INTRODUCTION

Novel coronavirus (COVID-19), also known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is a new public health crisis threatening the world with increasing prevalence.[1] To Date, more than 110 million cases have been confirmed, with over 2 million mortality cases.[1,2] The body parts with the highest viral load include nasal cavity, nasopharynx and oropharynx, lymphocyte of oral tissues, goblets and ciliated cells within the respiratory epithelium of the nose. These parts have the highest main receptor for SARS-CoV-2, i.e., ACE2 (angiotensin converting enzyme II) receptor.[3,4] The COVID-19 pandemic requires the public to comply with health protocols and adopt new habits as this disease spreads through droplets and enters the respiratory tract through the nose and mouth.[1]

Istinsyaq refers to the process of breathing water into the nostrils, while *istintsar* is the opposite.[5] The breathing of water into the nasal cavity (*istinsyaq*) and out (*istintsar*) during ablution as Islamic approach corresponds with the concept of the nasal rinse and gargling methods, which prevent the mechanical and chemical attachment of viruses. There are several types of holy water suitable for ablution, including rain, spring, sea, river and well water, and dew and snow.[5]

Although study regarding the effect of *istinsyaq* and *istintsar* for reducing the number of pathogens is still limited, various studies have proven that practicing nasal rinse and gargling using plain water or hypertonic saline can reduce the number of pathogens, including viral load.[6,7] Besides, nasal rinse and gargling with pure water also tend to incite mechanical resistance to viruses, resulting in increased mucus secretion.[7,8] Therefore, this study aims to examine the role of Islamic-based gargling and nasal rinse in preventing COVID-19 infection.

Nasal Rinse and Gargling as The Prevention of COVID-19

A nasal rinse is a simple technique to clean out the nasal passages with a solution gently. Meanwhile, oral rinse or gargling is an effort to clean the oral cavity through water disposal.[8,9] Chemically, nasal rinse and gargling have antiviral effects that induce damage to the virus cell wall, thereby preventing inflammation and disintegration of the respiratory cytosolic enzymes chain. Mechanically, an osmosis effect which is a process of water movement from hypotonic to hypertonic concentration is induced, resulting in a reduction in mucus secretion, and the pathogen flushing with the water stream. Nasal rinses interrupt the viscous surface layer, mucus separating and its related particulate matter. Also, the presence of nasal saline improves the deeper aqueous layer hydration, thereby increasing the underlying strength of the ciliary beat and decreasing local inflammatory mediators.[6,8–10]

During a viral respiratory infection, where mucociliary dysfunction and mucostasis occur secondary to the inflammatory response, the chemical and mechanical action of nasal rinse and gargling is especially helpful. Hence, these actions are an effective method of eliminating antigens, inflammatory mediators, decreasing viral load, which act as an alternative non-pharmacological preventive method to reduce transmission rates.[6,8]

Types of Solution

a. Plain Water

Flushing of the nasal cavity using plain water facilitates mucus as well as debris evacuation. Several studies showed that by performing ablution like saline as nasal rinse gold standard with plain water once, there was a ½ reduction in pathogens number, suggesting that when it is done five times like the practice of ablution in Islamic ritual, it is possible to achieve a minimum pathogen number in the nasal cavity.[7,11]

The plain water used in ablution tends to reduce microbial contamination.[12] Besides, due to the size of SARS-CoV-2 (about 125 nm), it is thoughtful to install a water filter having a 10 nm or 1 nm pore size; this enables the mechanical clearance of the SARS-CoV-2 virus from the nasal cavity. Furthermore, boiling water before using it for nasal rinse or gargling is also important to ensure water cleanliness.[12,13]

b. Saline

The use of seawater-based saline as a nasal rinse three times a day for eight weeks tends to alleviate symptoms of respiratory tract infections and sufficient in reducing viral load in saliva.[8] In general, the use of saline in nasal rinsing has many benefits, including nasal flushing pathogens, improving nasal mucociliary clearance, clear sinus passages, and improving breathing by removing fluid from the mucous membrane, and reduce nasal swelling along with other respiratory problems.[14]

Isotonic saline, which consists of a sodium chloride concentration of 0.9%, has potentially reduced the number of foreign particles from the airways for 6 hours. This mechanism is caused by changes in the airway-lining fluid properties, increasing the lung exhalation capability, resulting in the expulsion of foreign particles from the airway.[6,15] De Servi B et al. noted that the properties of isotonic saline are very close to the natural human plasma; therefore, it is effective in reducing the number of pathogens and harmless to the respiratory mucosa.[16]

Hypertonic saline with a concentration of > 0.9% has a higher osmolarity. Hence, it can draw water from inside the cell and leads to increased hydration of the mucosal layer that boosts the mucociliary clearance activity of the nose and provides mechanical protection against the COVID-19 virus.[6] When repeatedly practiced, nasal rinsing and gargling using hypertonic saline increases Cl-ions that fight preliminary SARS-CoV-2 infection and had a positive impact on reducing the COVID-19 virus.[17] Several studies showed that individuals who practice nasal rinse and gargling using hypertonic saline had a shorter duration of illness and were the best choice in inhibiting viral replication.[10,18] Therefore, saline is recommended because the procedure is simple and cheap. Also, the use of saline as a nasal rinse or oral gargling rarely causes side effects.[8]

c. Povidone Iodine

Povidone-iodine is a useful virucidal agent that induces oxidation of the viral nuclear structure, thereby destroying the viral capsid and envelope.[19] When dissolved in water, it produces free iodine compounds that oxidize fatty acids in the viral cell walls and inhibit inflammation of the host tissue, leading to the inactivation of the SARS-CoV-2 virus.[3] A study in Japan also supported the virucidal activity of povidone-iodine, which effectively inactivated the SARS-CoV strain after 2 minutes of use.[20] Povidone-iodine was recommended as a virucidal solution suitable for reducing evaporated viral particles before reaching barriers or surfaces. There was a reduction of > 4 logs 10 in the viral load. Meanwhile, there was no toxicity or cell death by practicing nasal rinse and gargling using povidone-iodine.[21–23]

Other studies have also demonstrated the use of 0.5% povidone-iodine for 30 seconds every 6 hours as a mouthwash and nasal rinse.[24] This practice was recommended for health workers and patients with suspected and confirmed COVID-19 cases to reduce cross-infection in the hospital setting. However, gargling using 0.4% povidone-iodine tends to inactivate the ACE2 oropharyngeal receptor and salivary glands against SARS-CoV-2.[3,25]

Besides, nasal rinse or oral gargling using Povidone-iodine has proven to be relatively safe as it causes no discoloration of the tongue or teeth and incites no changes in taste sensation.[9] However, usage > 2.5% is not recommended as it incites toxic effects on the nasal mucosa and ciliated epithelium.[21]

d. Other antiseptics

The use of chlorhexidine has previously been observed in viruses having an envelope composed of fat such as herpes virus, influenza A, hepatitis B. However, 0.12% chlorhexidine had no significant effect on COVID-19 patients. Nevertheless, SARS-CoV-2 was reportedly suppressed after 15 mL 0.12% chlorhexidine application.[9]

Hydrogen peroxide is often used in tooth procedures, and a previous study reported that 3% H_2O_2 was effective against adenovirus, rhinovirus and coronavirus 229E strain, as these viruses were inactivated for 1-30 minutes by oxidizing the viral envelope resulting in a decline in salivary viral load.[9] Besides, 0.5% H2O2 also inactivated viruses such as MERS-CoV, SARS-CoV, and HCoV after 1-minute application.[26]

Ethanol has distinctive virucidal activity, where the use of 62-71% ethanol was effective in inactivating viruses. However, based on the report, the solution is not suitable for nasal rinse or gargle.[21,26]

Cetylpyridinium chloride, this solution potentially destroys the capsid of the SARS-CoV-2 virus and has been tested for its usefulness in cases of gingivitis and is effective in virucidal activity against influenza cases.[9] Meanwhile, Cyclodextrins inactivate viruses by changing the outer layer and destroying infected particles. This solution has been shown to reduce influenza A by depleting cholesterol from viral particles and is also suggested in the cases of SARS-CoV-2.[19,27]

CONCLUSION

Gargling and nasal rinse have an important role in preventing COVID-19 infection, especially when practiced routinely. Although obligatory, ablution has distinctive impacts on preventing COVID-19 transmission. Hypertonic saline is recommended for ablution as a solution for washing the oral and nasal cavity.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the manuscript.

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AUTHOR CONTRIBUTION

All authors are contributed equally to the content of the study

ETHICAL STATEMENT

None.

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