

# Hypertonic Saline Use and Traditional Nasal Irrigation: A Possible Preventative Measure against COVID-19

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## ABSTRACT

Saline nasal irrigation (SNI) is a clinically established treatment that has been used to manage upper respiratory infections and allergies; there is also some indication that it may be effective in the setting of coronavirus disease-2019 (COVID-19). The possible advantages of SNI include the following benefits due to the well-known antiviral impact of sodium chloride (NaCl) and the mechanical cleansing effect arising from the irrigation method. First, there will most likely be a decrease in COVID-19 infection rates; second, illness severity will be lowered; and third, community transmission will be mitigated. Despite the need for more concentrated research into these aspects, public health organizations should emphasize alternate infection mitigation measures such as SNI in light of the ongoing COVID-19 problem, low global vaccine supply, and the rapid introduction of SARS-CoV-2 variants.

**Keywords:** Community transmission, COVID-19, Pandemic, Prevention, Saline, SARS-CoV-2.

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## INTRODUCTION

Saline nasal irrigation is a general term that encompasses a variety of nasal irrigation techniques such as Jala-neti (traditional nasal ablation), saline nasal sprays, saline nasal drops, and aerosolized saline.<sup>1,2</sup> Among these methods, Jala-neti (JN) is a more prominent nasal lavage procedure. In this approach, the nasal passages are thoroughly washed using the neti-pot, a specialized vessel with a spout available for feasible saline delivery (Fig. 1).<sup>1</sup> Unlike low-volume, ready-for-use options like saline sprays and drops, high-volume options like JN are more suitable for indoor settings and could be particularly beneficial due to extensive irrigation and significant mucosal wetting (Fig. 1). As a result, JN might more efficiently transport saline to deeper nasal cavity areas, washing away mucus packed with dust, fungus, bacteria, and respiratory viruses. Each saline delivery method has its own merits and can be opted for based on feasibility.

Sodium chloride solution (particularly in hypertonic concentrations) has been found to have a potential effect against a variety of DNA/RNA viruses, including coronaviruses.<sup>2,3</sup> *In vitro* investigations also revealed that NaCl (at 1.5% Conc.) inhibits the severe acute respiratory syndrome coronavirus 2 completely (SARS-CoV-2).<sup>4</sup> In nonhospitalized coronavirus disease-2019 (COVID-19) patients, a more recent interim analysis revealed that hypertonic saline causes symptom alleviation (nasal congestion and headache).<sup>5</sup> Clinical trials investigating the role of SNI in COVID-19 are now underway, and more information is becoming accessible.<sup>6</sup>

## SNI FOR COVID-19: POSSIBLE MECHANISMS OF ACTION

Because of its direct antiviral impact, several SNI techniques with saline could benefit COVID-19 patients. The streamlined water column generated while performing SNI methods like JN could mechanically wash the SARS-CoV-2 viral particles and mucous secretions (that entrap the SARS-CoV-2 virus) from the anterior and posterior nasal areas and the upper nasopharyngeal region (key reservoirs and portals for entry of respiratory viruses including

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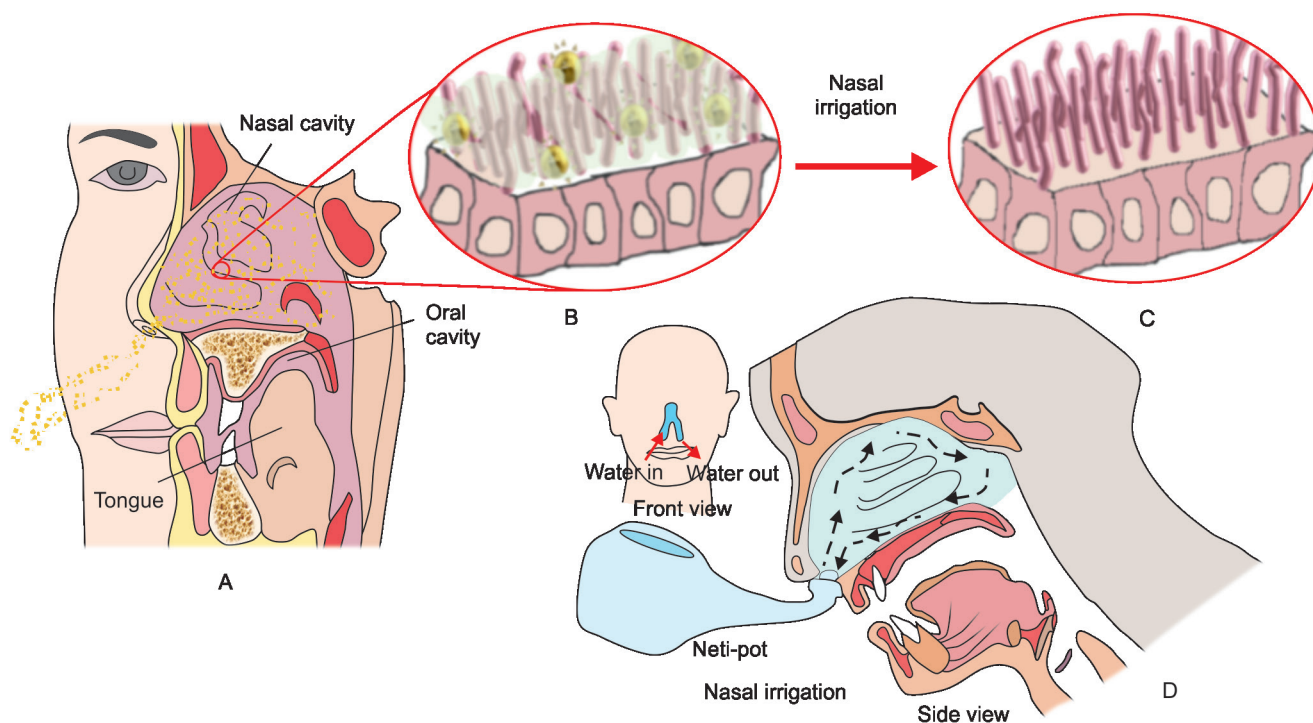
SARS-CoV-2).<sup>1</sup> Interestingly, due to antiviral and mechanical effects, SNI may also reduce the possibility of SAR-CoV-2 microaspiration into the pharyngeal regions and respiratory tracts, including lung alveoli.<sup>7</sup> Mucous clearance also allows for unrestricted ciliary movement, which may increase the mucociliary response to infection (Fig. 2). Notably, the “SARS-CoV-2 oro-nasal viral load” is a vital determinant in community transmission.<sup>1</sup> It is evident that saline gargling could reduce the oral-viral load of SARS-CoV-2,<sup>8</sup> and SNI may have a similar impact on the nasal-viral load.<sup>1,9</sup> Frequent use of SNI may reduce COVID-19 infection rates, illness severity, and, most crucially, community transmission as a result of the aforementioned processes. Thereby, SNI methods are beneficial to both individuals and communities.

## Need for Recognition and Implementation of SNI during Respiratory Viral Pandemics Like COVID-19

Pharmacological therapies are frequently overemphasized in current healthcare practice, while ancient approaches (such as JN)



**Fig. 1:** Copious nasal irrigation is achievable with Jala-neti. The practitioner must assume the appropriate head position and should bring the spout of the neti-pot close to the nostril. Saline is then passed from the higher to the lower nostril, and cleansing is performed for both nostrils. The practitioner should perform mouth breathing while doing Jala-neti to avoid water retention issues. As the neti-pot contains a sufficient volume of saline, adequate irrigation is possible, and mucous clearance is satisfactory (Dr Prashanth Panta is the demonstrator)

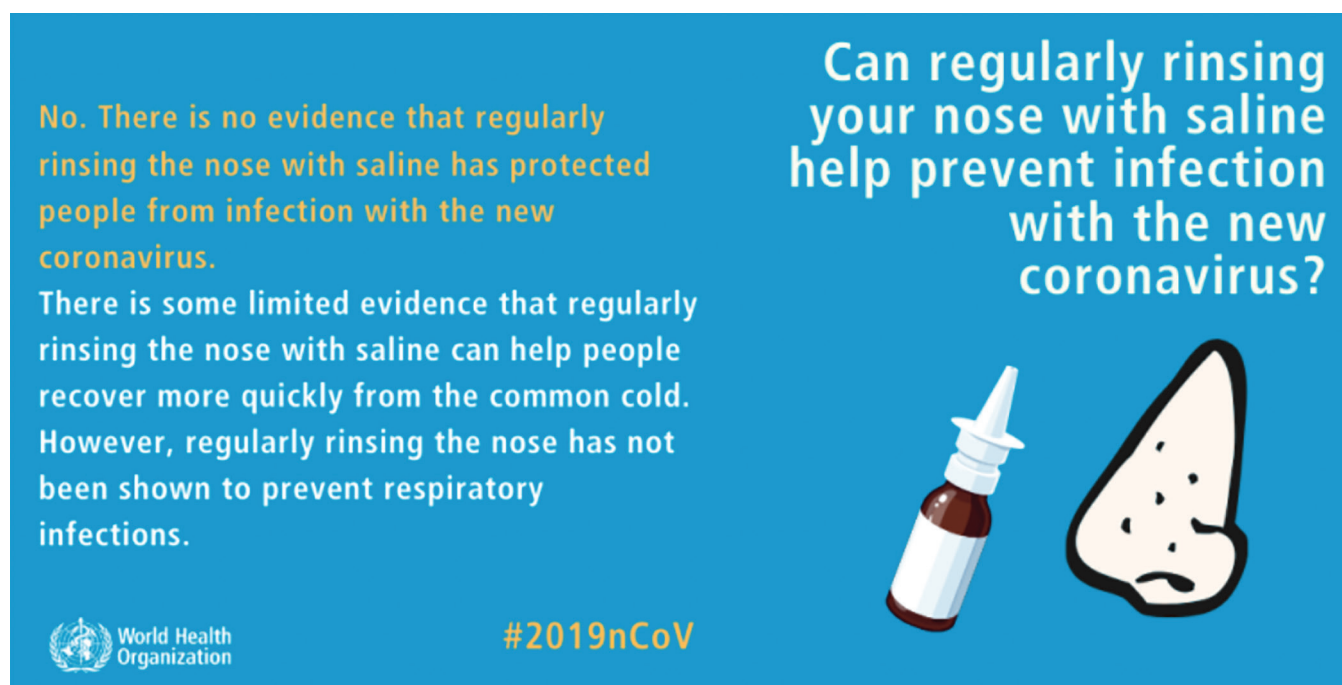


**Figs 2A to D:** Schematic representation of the (A) Nasal and the oral cavity; (B) Nasal cilia covered with mucus; (C) Clean nasal cilia following the nasal irrigation practice; (D) Front and side view of the nasal cavity during nasal irrigation and the direction of liquid flow. (Adapted with permission from Baruah B. Could simultaneous nasal and oral irrigation be a nontherapeutic tool against SARS-CoV-2? ACS Chem Neurosci 2021;12:2–4. Copyright 2021. American Chemical Society.)

are frequently ignored and underexplored. During pandemics, a more in-depth understanding of disease prevention is required.<sup>10</sup> As viral pandemics (like COVID-19) rapidly reach a stage of community transmission and remain unresolved for prolonged periods, we must actively extrapolate knowledge from various healthcare systems. In situations like these, relying only on evidence-based approaches may cause more harm than good, and relying on supportive measures is a worthwhile effort. We must recognize that

gathering evidence concerning the SNI's role in COVID-19 would be time-consuming. Therefore, we must place the findings of related research in a proper perspective.

According to the World Health Organization (WHO), "Saline usage" is one of the COVID-19 fallacies. We believe that health misconceptions must be readily busted during the pandemic, as many people fall prey to disinformation and disregard current treatment guidelines. However, we are convinced that using



**Fig. 3:** The myth-buster about saline use that was posted on the World Health Organization website (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters#saline>)

hypertonic saline is not a health myth. The statement on the WHO website that “there is no evidence that regularly rinsing the nose with saline has protected people from infection with the new coronavirus” is not properly justified (Fig. 3). Given the supporting evidences released earlier and recently, it would be advantageous if WHO took a more balanced approach and revised the myth-buster regarding the use of saline.<sup>11</sup> Negative or even neutral judgments regarding SNI from reputable organizations could lead to widespread skepticism, and a reduction in public adoption.<sup>11</sup> Because SNI approaches have demonstrated to be effective against a wide range of upper respiratory viruses, public health organizations (at the global and national levels) should consider supporting their usage in the future. A greater level of awareness is required.

### The Beneficial Effects of JN Greatly Outweigh the Risk

Although JN has been linked to a minor risk of meningoencephalitis in a few cases,<sup>12–14</sup> the merits of this no-cost, practically feasible, and scalable intervention must not be overshadowed by the limited number of reports. The benefits of JN far outweigh the risks. It is worth noting that such negative consequences can only occur when contaminated water is used. The use of clean water and sterilized vessels (following basic infection control recommendations) dramatically reduces the risk of such preventable complications.

### Critical Gaps that should be Addressed to Improve JN Use

As water retention is possible with repeated JN use, we must formulate an appropriate water-draining protocol (preferably a breathing and bending exercise series). There is also a need to work on the ideal design characteristics of the neti-pot and the appropriate head position and frequency of use that would significantly impact sino-nasal clearance and infection control.

Finally, there is also a need to eradicate the pathogenic microbes within the water source (preferably by incorporating activated coatings in water collection devices).<sup>12</sup>

### SNI: A Vital Armor against COVID-19

Although many people are now practicing critical infection-prevention tactics such as social distancing, face mask use, and frequent handwashing, respiratory hygiene methods such as SNI are also effective in preventing COVID-19. The worldwide immunization campaign has begun in many countries and has reached a considerable portion of the population in a few; it is vital to realize that there could be potential challenges due to the emergence of SARS-CoV-2 variants like omicron and COVID-XE. In such a scenario, it is beneficial to adopt alternative mitigation strategies for additional protection. Therefore, SNI deserves global implementation even at the current stage of the pandemic. It is especially relevant in the healthcare workers and other frontlines exposed to the SARS-CoV-2 virus on a more regular basis.<sup>1</sup> It could also benefit other vulnerable populations like those with pre-existing medical conditions and the elderly. Furthermore, it may be immediately beneficial in COVID-19 individuals who are not hospitalized and have a relatively minor condition.<sup>1,5</sup> If practitioners are concerned that viruses in the water exiting the nostrils will contaminate neighboring surfaces, they can practice JN in isolation to eliminate this risk. As a result, we must seriously consider SNI as a preventive strategy and practice it on a regular basis, based on feasibility and the level of indoor activity.

### Concluding Remarks and Future Directions

Based on previous studies and increasing supportive evidence, nasal irrigation with hypertonic saline can be regarded as a critical measure in our fight against COVID-19. To shed more light on this issue, we advise doctors and researchers to conduct more rigorous clinical and *in vitro* studies. A clinical-comparative examination of the various

SNI techniques is also required (JN vs nasal spray, nasal spray vs nasal drops, etc.). Nonetheless, SNI approaches must be considered because they are simple, low-cost, and relatively safe home-based respiratory hygiene procedures. Additionally, saline gargling can be used to increase the overall impact of SNI against COVID-19.

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