

Nasal Irrigation in Covid-19 Pandemic: Is It Justified

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Abstract: Nasal irrigation is an old and well-documented practice originating in ancient India for taking care of the upper respiratory tract. It is a relatively common and beneficial method for maintaining nasal hygiene. It not only flushes out allergens and mucus, but also keeps the nose moist. Hence, it augments clearance of the sinonasal cavity. Here, we are making a modest attempt to discuss the relevance of nasal irrigation and its potential use during the current COVID-19 pandemic. We believe that regular alkaline nasal irrigation is an inexpensive and simple preventive and therapeutic measure in all cases of upper respiratory tract infections. In the absence of a suitable vaccine or an antiviral agent for SARS-CoV-2, we can recommend regular alkaline nasal douching as a safe and effective intervention that can be implemented globally.

Keywords: nasal irrigation; COVID-19 pandemic; upper respiratory tract infection

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I. Introduction

Nasal irrigation also referred to as nasal toilet, nasal douching or nasal lavage, is a personal hygiene practice in which the nasal cavity is washed with a sterile solution to flush out pathogens, mucus and debris from the nose and paranasal sinuses.

Nasal irrigation is an old and well-practiced treatment for nasal and sinus pathologies since ancient times. It has its roots in Ayurveda, where it was referred to as “*jala neti*”, which in Sanskrit literally means “nasal cleansing” [1]. It was recommended in Yogic texts as treatment for the common cold and has been in use in India and South-East Asia since time immemorial. This technique uses gravity to flush out allergens, pathogens and debris along with the irrigating solution through the nasal cavities. Rabone et al in their study reported significant reduction in colds and sore throats amongst Australian wood-workers who practiced *jala neti* for a year [2].

The nasal cavity is rich in mucus, serous, seromucous and mucoserous glands. These glands are responsible for nasal secretions, which if thickened, form an ideal growth medium for a majority of allergens and pathogens, including SARS-CoV-2. Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is a beta-coronavirus and belongs to the family of coronaviruses typically responsible for upper respiratory tract infections [3]. It is an enveloped virus and is responsible for the global pandemic coronavirus disease (COVID-19). Though it shares similarities with other members of the coronavirus family, there are certain variations, such as the rate at which it can spread in a population. It does not segregate, nor does it discriminate, and can affect all ages, genders and ethnicities. High titres of SARS-CoV-2 have been detected in the upper respiratory tract of both, asymptomatic and symptomatic individuals suffering from COVID-19 [4]. The viral load in the nose is far higher than that found in the throat [4] and thus, these sites are the primary source of infection and viral replication. These studies have also found out that higher the viral load in these sites, more is the severity of the disease.

Thus, measures like nasal irrigation can help control viral shedding and help reduce the rate of transmission, besides reducing nasal dryness, and facilitating clearance of mucus and debris.

COMPOSITION AND PREPARATION OF NASAL IRRIGATING AGENT :

The nasal irrigating solution is easy to make and the components involved are cheap and readily available. We recommend the use of an isotonic alkaline saline solution containing sodium chloride (NaCl), sodium bicarbonate (NaHCO₃) and freshly boiled and cooled water.

We take half teaspoon or 3 gm of non-iodide salt (iodine causes nasal irritation) and mix it with a quarter teaspoon or 1.5 gm of sodium bicarbonate (baking soda). We then dissolve this in 500 mL of freshly boiled and cooled water (cooled to room temperature). This mixture has an alkaline pH of approximately 8.3. We then pour this solution into a nasal irrigation pot (neti pot) or a squeeze bottle, and irrigate our nasal cavities regularly. In the current times, amidst the COVID-19 pandemic, irrigation should be carried out twice a day for

better efficacy and prevention. Unused solution should be discarded and fresh solution should be prepared for each administration [5].

MECHANISM OF ACTION OF NASAL IRRIGATING AGENT :

The exact mechanism of action of nasal irrigation is not clearly established. The mucus lining of the nasal cavity is one of the body's first lines of defense against any pathogen. These pathogens are often entrapped in the mucus lining of the nasal cavities. Nasal irrigation has a fluidizing action and helps clear thick nasal secretions. Previous studies have shown a mechanical intervention, where it causes mucus lining softening and dislodgement, and removal of inflammatory mediators like leukotrienes and prostaglandins, irrespective of the composition of the solution used [6]. This favours early resolution of upper respiratory tract infections.

The fact that chloride/halide salts inhibit viral replication was first reported in the 1960s [7]. Ramalingam et al provided laboratory evidence that non-myeloid cells, such as epithelial cells and fibroblasts, have an innate immune mechanism, which fires into action in the presence of sodium chloride (NaCl), by producing hypochlorous acid (HOCl) from chloride ion (Cl⁻) [8]. Hypochlorous acid, which is the active ingredient in bleach, has a known antiviral action and can inhibit both enveloped and non-enveloped viruses. Thus, by supplying chloride ions in the form of nasal saline irrigation, we can augment the action of hypochlorous acid.

The relation between tonicity of the solution and mucociliary clearance has not been clearly defined. However, salt concentration of the irrigating solution is related to the composition and activity of the sinonasal secretions [9]. Isotonic solutions were found to have an immediate and significant effect on reducing the microbial load, whereas hypertonic solutions had only a marginal effect. Also, concentrations of lysozymes and lactoferrins were found to be increased by 30%, 24 hours after nasal irrigation [10]. Bicarbonate ions reduce viscosity of the mucus. It also acts as an exfoliating agent and helps neutralize the virus by irritating the viral envelope.

Sodium chloride (NaCl) and sodium bicarbonate (NaHCO₃) do not react with each other. Both species contain sodium ions, so a double replacement reaction is not possible. The chloride ion is too weak a base to deprotonate the bicarbonate ion. As a result, there is no significant acid-base reaction. Also, both these ions are neither strong oxidizing agents, nor reducing agents. Therefore, even redox reactions do not occur between them.

Thus, alkaline nasal irrigation is a relatively safe method of moisturizing the nasal mucosa and facilitating clearance of mucus, crusts and debris.

II. Tolerability And Safety

Nasal irrigation has minimal side effects in adults and compliance to it is great. Toomoka et al in a study conducted in 2000 described certain transient adverse reactions, such as nasal discomfort, nasal irritation, earache and pooling of saline solution in the paranasal sinuses with subsequent drainage [11]. Tolerance to nasal irrigation and evaluation is best judged by the operator instead of the patient, more so when the patient is a child. This is because evaluation and tolerance of nasal irrigation is difficult to judge in cases of children. Careful attention should be given to the temperature of the irrigating solution, as too hot or too cold solutions lead to reduced tolerance. Jeffe et al in a study on tolerance and compliance of nasal irrigation amongst the pediatric population found that out of the 57 patients between ages 2-16 years, 14% accepted the treatment after the first use, 73% in less than 7 days, and 11% in a period between 7 and 14 days [12].

In spite of there being an increased risk involved with nasal douching, such as surfaces of squeeze bottles and neti pots harbouring the virus, nasal douching is still beneficial, provided the douching is performed in the safest manner possible. Irrigating devices, irrespective of their type, that are used regularly without adequate cleaning can become easily contaminated [13,14]. The irrigation device should therefore be cleaned with soap and filtered/distilled water, both inside and outside, after use, so as to remove particulates like mucus [15]. This also helps in the subsequent disinfectant to work better. Disinfection can be carried out easily at home by either boiling all the components of the device in water for a few minutes, or by cleaning it using 70% isopropyl alcohol, followed by air drying.

In the past few months, studies have been carried out recommending nasal hypertonic saline irrigation in cases of COVID-19 [16]. We however, would like to recommend nasal irrigation using isotonic saline solution mixed with sodium bicarbonate. This is because hypertonic nasal saline has few disadvantages. It can be painful to the patient as it causes release of substance P and glandular secretion by stimulating the nociceptive nerve fibres [17]. It also induces sputum production which in turn can lead to bronchoconstriction, more so in patients with underlying obstructive pulmonary disease [18]. On the other hand, isotonic solution is cheap, easy to prepare and has less adverse effects, besides being supremely beneficial in maintaining a healthy nasal mucosa.

III. Conclusion

In the present times, with the rise in COVID-19 cases, regular nasal douching is an easy, safe and cost-effective method for clearing out pathogens from the nasal cavity. Many studies have been carried out on the effect of alkaline nasal irrigation in the setting of viral upper respiratory tract infections. In almost all such studies, patients treated with alkaline nasal irrigation had decreased viral shedding compared to the control group. Components used in nasal douching besides being cheap and easily available, are widely considered to be safe. As SARS-CoV-2 is an enveloped virus, mild detergent application with alkaline nasal solution can neutralize the virus. We believe that regular nasal irrigation can reduce the viral load and hence its transmission, besides reducing nasopharyngeal inflammation and secondary bacterial load in patient infected with COVID-19, though extensive research is still needed to have an in-depth knowledge.

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