



Review Article

A review on the therapeutic effects of *Neti Kriya* with special reference to *Jala Neti*

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ABSTRACT

Neti kriya is an integral part of shatkarmas/the six cleansing techniques that form the most important aspect of hatha yoga. Neti helps in preventing and managing upper respiratory tract diseases. An attempt is being made to collate and review articles that highlight the therapeutic effects of neti kriya. Databases like PubMed (January 1980–April 2016), Scopus and Ayush Portal were searched. We used keywords like jala neti, neti kriya, neti combined with terms such as yoga, sinusitis, rhinitis, common cold, vision, snoring, nasopharyngeal carcinoma and mental health for the search. As only a few results were obtained, we reviewed relevant studies with saline nasal irrigation. Evidence emerging from this review suggests that neti offers manifold benefits and relief from the antibiotic grip. Most studies support the role of neti in treating sinusitis, rhinosinusitis, allergic conditions and in improving vision. Jala neti has a significant role in improving the presence of mind and intelligence. We identified that it can be applied in mitigating post irradiation rhinosinusitis in nasopharyngeal carcinoma. However, randomized control trials must be conducted to substantiate the therapeutic efficacy of this simple cost-effective, non-pharmacological mode of treatment.

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1. Introduction

Hatha yoga is appraised to be one of the most significant tools to overcome various physical and psychological problems. *Hatha Yoga Pradipika* (H.P) [1] and *Gheranda Samhita* [2] described *Shatkarmas*. 'Shat' means six and 'karma' implies action; *Shatkarma* consists of the six purificatory procedures. It should be practiced when *Medas* and *Kapha* were in excess. *Dhauti*, *Basti*, *Neti*, *Trataka*, *Nauli* and *Kapalabhati* were the six cleansing processes [3]. Among these *Neti* eradicates *Kaphaja* disorders and improves vision [4]. Improper management of sinusitis and associated symptoms lead to asthma. In India, there are an estimated 15–20 million asthmatics [5]. WHO estimates that 235 million people currently suffer from asthma [6]. The human and economic burden associated with such diseases are severe. There is not much proof to substantiate the benefits of using antibiotics routinely in the treatment of upper respiratory tract infections in children or adults. Also, there is an increase in adverse

effects associated with the usage of antibiotics in adult patients [7]. Hence there is a need for a non-pharmacological, low-cost, effective mode of treatment to improve the quality of health. The objective of the review was to summarize current pieces of evidence from authentic studies on the therapeutic effects of *Neti Kriya* with special reference to *Jala Neti*.

2. Review methods

To acknowledge the therapeutic importance of *Neti*, we performed a systematic review of peer-reviewed articles published in PubMed (January 1980–April 2016), Scopus and Ayush Portal. We used keywords like *jala neti*, *neti kriya*, *neti* combined with terms such as yoga, sinusitis, rhinitis, common cold, vision, snoring, nasopharyngeal carcinoma and mental health for the search. When the search was carried using *jala neti* (Title/Abstract) only 1 result was obtained and 15 results were obtained on *neti* (Title and Abstract). Articles available on 'neti and yoga' were 5 and 'neti and sinusitis' were 3. Only 1 result was obtained each in 'neti and vision', 'neti and headache', 'neti and snoring' and 'neti and mental health'. Zero results were found for search using *neti* combined with migraine, cold, asthma, allergen and nasopharyngeal

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carcinoma. Only a few results were obtained on relevant studies with saline nasal irrigation. Authentic text books and pertinent websites were also referred.

3. Shatkarmas

According to *Hatha Yoga Pradipika dhauti, basti, neti, tratika, nauli and kapalabhati* are the *Shatkarmas*. The *shatkarmas* bring about purification of the body and have manifold benefits. They were meticulously practiced by eminent yogis (H.P verse 23). Besides boosting the vital capacity, they bring about smooth and perfect functioning of bodily systems, thereby preparing one to perform higher practices like pranayama.

4. Neti

Neti is a technique to cleanse the nasal passages. It is a cleansing process related to the upper part of the respiratory system. Neti may be broadly classified into jala neti and sutra neti. Although authentic references are not available for jala neti, it is most widely practiced. It is usually practiced with a neti pot filled with lukewarm saline water. The exact amount of salt is not mentioned in any traditional texts. Practically it is about 2.5 g for 500 L of water. Based on clinical studies use of proper salt concentration (2–3.5%) has been recommended in nasal irrigation [8]. Some authors mention about the use of *ksheera* (milk) and *madhu* (honey) instead of lukewarm water. It is ideally practiced in morning before asanas and pranayama. In *Hatha Yoga Pradipika* it is stated that a lubricated *Sutra* is inserted through the nose to the length of one hand span so that it comes out of the mouth. This is named *Neti* by the Siddhas. Now a days 4 size rubber catheter is sterilized and used. Those suffering from chronic nasal bleeding, ear infections and nasal septum deviation should perform under proper guidance.

5. Therapeutic effects

Neti cleanses cranium, gives clear sight and alleviates diseases which manifest above the root of the neck (H.P verse 30). *Neti* removes foreign bodies like allergens, dust and enhances the drainage of sinuses by preventing stasis of mucus. It also increases blood circulation and functional efficiency of the nasal mucosa. *Neti* provides a relaxing and irrigating effect upon the eyes by stimulating the tear ducts and glands. It has a positive effect on cognitive faculties like memory, concentration and is beneficial in reducing anxiety and depression. By the systematic practice of *neti*, secretory and drainage mechanisms of the entire ear, nose and throat area are well maintained. This helps to keep at bay conditions like sinusitis, cold, cough, allergic rhinitis and insensitivity to smell [9].

From our review, we have found that *neti* can effectively be applied in conditions like sinusitis, rhinitis, rhinosinusitis and allergic rhinitis which are *kapha* predominant.

5.1. Role of neti in sinusitis

In chronic rhinosinusitis saline irrigation is one of the keystones of treatment. Patients, who practiced daily nasal irrigation had improvement in symptoms of chronic sinusitis up to 70% after 2 weeks of treatment. In these patients the use of medication had decreased considerably [10]. Evidence supports that there was a significant improvement in nasal symptoms and health status of patients with sinonasal disease who had undergone treatment twice daily for 6 weeks [11]. In a 1 month study of chronic sinusitis in children aged 3–16 years, it was found that the use of hypertonic saline reduced cough and nasal secretion [12]. Main clinical features of chronic sinusitis are purulent nasal discharge, foul smelling

discharge, local pain, headache, nasal stuffiness and anosmia [13] which may be compared with *dusta pratisyaya* in which major symptoms are *slesma sruthi* (discharge of fluid resembling pus), *mukha dourghandhya* (foul-smelling of mouth), *ura–parswa vedana* (pain in chest and flanks), *nasa roddham* (blockage of nasal passage) [14] and *gandha na vethi* [15] (anosmia). Analyzing these it is advisable to use *neti* in *dusta pratisyaya*. Most studies consider saline nasal irrigation effective in the management of sinusitis. We may infer that *neti* can be adopted as a first-line treatment. Studies need to be done on *jala neti* so as to prove its efficacy in the management of sinusitis. Standardized protocol needs to be developed regarding the procedure.

5.2. Role of neti in rhinitis and rhinosinusitis

Georgitis demonstrated the utility of large particle vapor treatment and saline solution irrigation in reducing inflammatory mediators in nasal secretions which proves its efficacy in treating chronic rhinitis. Patients underwent heated vapor treatments at 41 °C for 20 min, at 43 °C for 20 min and simple nasal irrigation of temperature 39 °C for 15 min at weekly intervals. Nasal secretions were collected after each treatment at 30 min, 2 h, 4 h and 6 h. Inflammatory mediators were assessed using a competitive radio immuno assay. Histamine and leukotriene concentrations in nasal secretions decreased substantially after treatment with saline solution irrigation. It reduced histamine for a period of 6 h after a single 15 min treatment [16]. In a study Lee et al. has shown that both *manuka* honey and saline nasal irrigations resulted in the reduction of chronic rhinosinusitis. *Manuka* honey nasal irrigation was done by adding 10% of honey to saline solution. Culture negativity was statistically better for the group receiving *manuka* honey sinus irrigation twice daily for 30 days and without taking oral antibiotics/steroids suggesting that *manuka* honey alone may be effective for treating acute exacerbations of chronic rhinosinusitis [17]. *Manuka* honey is a monofloral honey obtained from manuka tree (*Leptospermum scoparium*) Myrtaceae family, seen in New Zealand and Eastern Australia. It has a polyphenolic composition and contains many bioactive compounds like glyoxal and methyl glyoxal. The antimicrobial activity of *manuka* honey against a wide range of bacteria including *Streptococcus aureus* and *Pseudomonas aeruginosa* has been studied [18]. In chronic rhinosinusitis bacteria are mostly involved in the form of biofilm, mostly of *Staphylococcus aureus* and *P. aeruginosa* biofilms. *In vitro* assessment of *manuka* honey against *S. aureus* and *P. aeruginosa* showed highly significant results [19]. Treatment in allergic fungal rhinosinusitis with 2 mL of a 50/50 mixture of honey–saline solution in a nostril one time a day for 30 days showed positive response in a few patients [20]. Prospective studies suggest that nasal saline lavage greatly reduced chronic sinonasal diseases and improved the quality of life in children aged 3–9 years when treatment was given for 1 month [21]. Major clinical features in rhinitis are rhinorrhea, sneezing, nasal obstruction, associated headaches and anosmia [22]. These may be compared to *nasasrava* (nasal discharge), *kshawathu* (sneezing), *siraguruthwam* [23] (heaviness of head), *siravyatha* (headache), *grana uparodham* (nasal congestion) of *pratisyaya*. Analyzing the above we understand that *neti* can be administered in *pratisyaya* and mainly in *kaphaja pratisyaya* as there is predominance of *kapha*. In yogic literature the use of *madhu* for *neti* has been mentioned. It is still unclear as to which type of honey is best suited and the accurate amount to be used in *neti*. Evidence substantiates the use of *manuka* honey in chronic rhinosinusitis. Authentic work needs to be done to identify the benefits of using *madhu neti*. Rhinosinusitis, both acute and chronic which is a major concern in the pediatric group can be managed by saline nasal irrigation. This shows that *jala neti* is equally safe to be

practiced in children. More clinical trials to support its efficacy in this age group must be carried out. Care should be given to practice under proper supervision.

5.3. Significance of *neti* in allergic rhinitis

The most important of inhaled allergens are animal dander, dust mite, mold and pollen. These pass through the nasal mucosa to come in contact with cell-fixed IgE antibodies. The resultant antigen–antibody interaction triggers a reaction in the local mast cells. This releases histamines which is the main cause for most of the symptoms [24]. As previously mentioned sinus rinsing helps clear out histamine and other inflammatory substances from nasal passages. Besides clearing the mucus that results from allergic reaction, it has a soothing effect on irritated nasal passages. Recent studies have shown that nasal irrigation removes histamine, leukotrienes and other inflammatory substances. A study was conducted to assess the effectiveness of saline nasal irrigation in the management of allergic rhinitis. Symptoms were assessed using visual analog scale. Immuno sorbent assay (ELISA) was done to detect contents of histamine and leukotriene. It revealed that 40 °C saline nasal irrigation reduced sneezing, nasal obstruction and the levels of histamine and leukotriene [25]. In a study children in the following age group were enrolled: pre-kindergarten (5 years), elementary school (6–12 years) and high school (13 years). Despite the age differences majority of children tolerated saline nasal irrigation. Mild side effects like ear pain, cough and nausea were reported in a few children. But this did not preclude the use of nasal saline irrigation [26]. Characteristic features of allergic rhinitis are watery nasal discharge, nasal obstruction, sneezing, stuffy nose, itching in eyes and palate [27]. It may be correlated to symptoms like *kapha sruthi* (discharge of thin fluid from nose), *grana uparodha* (nasal obstruction), *kshavathu* (sneezing) and feeling of insects crawling around eyebrows of *vataja pratisyaya* [28]. Hence advocating *neti* in *vataja pratisyaya* ought to give results. Currently, there is no effective medication that controls allergic conditions. From the studies it is wise to assume that *neti* can play a key role in treating allergies associated with upper respiratory tract conditions. This calls for controlled clinical trials to generate authentic data to substantiate the above.

5.4. Importance of *neti* in vision

A comparative study on the effect of *Saptamrita lauha* and yoga therapy in Myopia revealed that yoga therapy comprising of *jala neti*, *nadi shodhana pranayama*, *shitali pranayama* and *point tratata* exerted better improvement in associated changes of myopia when compared to *Saptamrita lauha* alone. Practice of *jala neti* and other yoga procedures were effective in symptoms like eye pain, eye strain, watering and heaviness of eye. The treatments were done for a period of 3 months with a 1 month follow up [29]. The above study supports the therapeutic efficacy of *neti* in improving vision. It is yet to be studied, in which all ophthalmic cases *neti* can be applied. Evidence has shown that when used as combined therapy *jala neti* yields a significant improvement in myopia. Systematic practice of *neti* results in the reduction of eye strain and subjective improvement in vision. However, the competence of *neti* as an exclusive therapy ought to be explored.

5.5. Application of *neti* in snoring

Ramalingam et al. reported that practicing *Sutra neti* helped the patient to control severe snoring and obstructive sleep apnea. This gave positive results for several months [30]. We do know that surgery carries uncertainty in the management of snoring.

The potential of *sutra neti* in this area needs to be studied. Thus a non-invasive treatment modality which guarantees minimal recurrence needs to be advocated.

5.6. Mitigating post irradiation rhinosinusitis in nasopharyngeal carcinoma

Nasal sinusitis is greatly reported after radiotherapy. It adversely affects the quality of life (QOL) of patients with nasopharyngeal carcinoma. A study by Luo et al. demonstrated that long-term nasal irrigation improved the quality of life of patients affected with nasopharyngeal carcinoma. Within 1 year itself there was relief in nasal symptoms. The duration of the study was 5 years [31]. In an year study, it was found that patients who underwent daily saline nasal irrigation for 6 months after radiotherapy had a better quality of life (QOL) than the non-irrigating group [32]. Therefore, it can be inferred that *neti* can be applied in this condition and can be safely practiced with ease.

5.7. Role of *neti* in mental health

Uma et al. developed an integrated approach of yoga comprising of *jala neti* as a therapeutic tool for mentally retarded children. It improved their mental ability, psychomotor coordination, intelligence and social behavior. In the 1 year controlled study, a remarkable improvement was found in mentally retarded children [33]. The study signals an important application of *jala neti* in improving the presence of mind, intelligence and in relieving stress. Research need to be undertaken in this field to validate the role of *neti* in treating psychological disorders.

5.8. *Neti* as a preventive approach

A study by Rabago et al. indicated that daily nasal irrigation with a hypertonic saline solution reduced the severity of symptoms in sinusitis, the occurrence of acute exacerbations and the need for antibiotic therapy. Participants used nasal irrigation for a period of 6 months [34]. In a 20 week study by Tano et al. on healthy adults, it was found that participants had lesser attacks of upper respiratory tract infections during the 10 week period of daily saline nasal irrigation than during the observational period of 10 weeks [35]. In spite of known side effects antibiotics are widely used. However, they do not offer complete cure nor prevent recurrence. On the other hand practice of *jala neti* restores the competence of nasal mucosa, wards off mucus, debris and reduces the chance of respiratory infections.

Major clinical studies reviewed are enlisted in Table 1.

6. Precautions and adverse effects

During the practice of *neti*, water should pass only through nostrils. Even if water enters the throat or mouth it does not cause any harm. Too little salt may induce pain and too much salt may cause burning sensation. After *neti*, *kapalabhati* should be performed to dry nostrils [36]. *Kapalabhati* consists of forceful exhalation followed by passive inhalation in rapid successions. After 10 rapid breaths, inhale and exhale deeply. This makes one round of *kapalabhati*. Practice up to three rounds. In chronic bleeding and structural deformities of nose, one should seek expert guidance while performing *neti*. Those prone to or having ear infections should avoid *neti* [37]. Apart from those mentioned in texts in the review we observed that mild side effects like ear pain, cough and nausea occurred in a few children but this did not preclude the use of nasal saline irrigation. It has been studied that hypotonic or very hypertonic can have harmful effects on mucociliary clearance and

Table 1
Major clinical studies reviewed.

Author & year	Type of trial	Indication	Population	Sample size	Treatment time	Group	Assessment criteria	Major findings
Uma K (1989)	Randomized controlled study	Mental retardation	Children	90	1 year	1 – Pranayama, jala neti, loosening exercises suryanamaskar, yogasanas, meditation 2 – Control group no treatment	IQ, social adaptation parameters	Improved mental ability, psychomotor coordination, intelligence, social behavior
Georgitis JW (1994)	Cross over design	Active allergic rhinitis	Adults	30	At weekly intervals – 1 month	1 – Heated vapor treatments at 41 °C for 20 min 2 – Heated vapor treatments at 43 °C for 20 min 3 – Simple nasal irrigation of 39 °C for 15 min	Nasal secretions collected after each treatment at 30 min, 2, 4 and 6 h Inflammatory mediators assessed using radioimmuno assay	Histamine and leukotriene concentration decreased, reduced histamine for 6 h after a single 15-min treatment
Shoseyov D (1998)	Randomized double blind study	Chronic sinusitis	Children 3–16 years	30	4 weeks	Hypertonic Saline group (HS) with hypertonic saline (3.5%) Normal Saline group-normal saline (0.9%)	Cough and nasal secretions/ postnasal drip PND radiology score	Reduced cough, nasal secretion in HS group
Tamooka LT (2000)	Prospective controlled clinical study	Sinonasal disease	Adults	231	Twice daily – 6 weeks	Treatment group-nasal irrigation using hypertonic saline delivered by Water pik device Control-sinonasal disease free subjects but did treatment	Nasal disease specific questionnaire Standardized health outcome measure Quality of wellbeing scale	Reduced nasal symptom and improved health status
Heatley DG (2001)	Randomized controlled clinical trial	Chronic sinusitis	Adults	150	2 weeks	1 – Nasal irrigation with bulb syringe 2 – With nasal irrigation pot 3 – Only reflexology massage	Rhinosinusitis outcome measure 31 score	Improvement in symptoms in 70% subjects, decreased medicine use in 35% subjects irrespective of device
Rabago D (2002)	Randomized controlled trial	Sinusitis	Adult	76	6 months	1 – Hypertonic saline solution – daily practice 2 – Control no treatment	Medical Outcomes Survey Short Form, Rhinosinusitis Disability Index, Single-Item Sinus-Symptom Severity Assessment (SIA)	Symptoms reduced and decreased use of medicines
Tano L (2004)	Randomized controlled clinical trial	Rhinitis	Adult	69	20 weeks study	10 weeks – daily saline nasal spray 10 weeks – only recording symptoms	Self-recording of symptoms in diary	Lesser attacks of upper respiratory tract infections
Thamboo A (2011)	Randomized, single-blind, prospective study	Allergic fungal rhinosinusitis	Adults	34	30 days One time a day	2 mL of a 50/50 mixture of honey –saline solution in a nostril, other nostril as control	Nasal Outcome Test (SNOT-22)	Symptomatic relief, high IgE levels in MH application
Jeefe JS (2012)	Survey	Nasal congestion rhinorrhea from sinusitis, chronic allergic rhinitis	Children 5 years 6–12 years 13 years Adults	61	4 months	Nasal saline irrigation	Parental questionnaires	Improvement in symptoms, mild side effects: ear pain, cough, nausea
Bhansal C (2014)	Comparative study	Myopia	Children (13–27 years)	60	3 months – follow up after 1 month	Group A – intake of saptamrita lauha, Group B – jala neti, nadi shodhana, shitali pranayama, trataka	Visual acuity, dioptric power, symptomatic scoring	Reduced eye pain, eye strain watering of eyes and heaviness of eyes in Group B
Luo H-H (2014)	Randomized clinical study	Nasopharyngeal carcinoma	Adults	1134	2 years, 2 times daily	A – nasal irrigator B – homemade nasal irrigation C – nasal sprayer	Quality of life using SNOT-20	Nasal symptoms reduced, improved QOL
Lin SY (2015)	Case series	Chronic rhinosinusitis	Children 3–9 years	10	1 month	Nasal saline lavage once a day	Sinus and Nasal Quality of Life Survey (SN-5), overall nasal quality-of-life (NQL)	Reduction in symptoms, improvement the quality of life
Lee VS (2016)	Prospective single-blinded randomized controlled trial	Chronic rhinosinusitis	Adults	42	30 days Twice daily	1 – Manuka honey (MH) irrigation/Saline nasal(SAL) irrigation with oral antibiotics/steroids 2 – MH/SAL without antibiotics/steroids	Sino-Nasal Outcome Test (SNOT-22) change score (primary), culture negativity, Lund–Kennedy endoscopic change score	Culture negativity statistically better on MH compared to SAL in patients not receiving antibiotics

can cause severe irritation [38]. Baraniuk et al. reported side effects like rhinorrhea, nasal pain and nasal obstruction when hypertonic saline was used [39].

7. Conclusion

According to yogic literature, *neti* is an important *shatkriya* which play a pivotal role in managing upper respiratory tract diseases. This review was done to bring to light the therapeutic efficacy of *neti kriya* with special reference to *jala neti*. We found that only minimal studies were published in indexed journals like PubMed, Scopus and Ayush Portal. Limited available yogic literary works and lack of research were the main shortcomings. Apart from *neti*, we looked into related studies with saline nasal irrigation. Studies signal that progression and occurrence of upper respiratory tract infections can be greatly reduced by the practice of *jala neti*. Researches support its efficacy in managing sinusitis, allergic conditions and improving vision. It appears to be equally effective in children and adults. Studies substantiate the use of *manuka* honey in chronic rhinosinusitis. Extensive work needs to be done to identify the benefits of using madhu neti. The promising result of *jala neti* in improving the intellectual potential of mentally retarded needs to be explored. The simple cost-effective, non-pharmacological mode of treatment can reduce the use of antibiotics and other suppressants. Further studies are needed to prove the efficacy of this therapy and establish the same as a science-based, evidence-based practice.

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None.

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