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

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A R T I C L E   I N F O
Article history:
Received 6 October 2017
Received in revised form 5 June 2018
Accepted 8 June 2018
Available online 5 January 2019

Keywords:
Pratisyaya
Histamine
Manuka honey

A B S T R A C T
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; Shat karma consists of the six purificatory procedures. It should be practiced when Medas and Kapha were in excess. Dhauti, Basti, Neti, Trataka, Nauli and Kapalabhathi 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

https://doi.org/10.1016/j.jaim.2018.06.006
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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, trataka, 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 various hatkarmas. According to 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 pratissyaya in which major symptoms are slesma sruthi (discharge of fluid resembling pus), mukha durabilitya (foul-smelling of mouth), ura–parswa vedana (pain in chin and flanks), nasa rodham (blockage of nasal passage) [14] and gandha na vethi [15] (anosmia). Analyzing these it is advisable to use neti in dusta pratissyaya. 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

Georitis 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 radioimmuno 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), siroguruthwam [23] (heaviness of head), siravaytha (headache), grana uparodham (nasal congestion) of pratissyaya. Analyzing the above we understand that neti can be administered in pratissyaya and mainly in kaphaja pratissyaya 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 svruthi (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 medicament 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 trataka 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 hypertonic or very hypotonic 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 suryana maskar, 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-saline saline 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 1 – Hypertonic saline solution – daily practice 2 – Control no treatment | 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 | 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 | Treatment | Self-recording of symptoms in diary | Lesser attacks of upper respiratory tract infections |
| Thamboo A (2011) | Randomized, single-blind, prospective study Survey | 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 | 61 | 4 months | Nasal saline irrigation | Parental questionnaires | Improvement in symptoms, mild side effects: ear pain, cough, nausea |
| Bhansal C (2014) | Comparative study | Myopia | Adults Children (13–27 years) | 60 | 3 months – follow up after 1 month | Group A – intake of saptamrita lauha, Group B – jala neti, nadi shodhana, tritali 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 spray | 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 in 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 improving the intellectual potential of mentally retarded 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.

Sources of funding

None.

Conflict of interest

None.

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