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ORIGINAL RESEARCH ARTICLE

Immediate Effect of *Jala Neti* (Nasal Irrigation) on Nasal Peak Inspiratory Flow on Healthy Volunteers

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ABSTRACT

Background: *Jala neti* (nasal irrigation) is an ancient *yogic* practice believed to cleanse the nasal passages and enhance respiratory health. The objective of this study was to evaluate the immediate effect of *Jala neti* on nasal airflow measured by peak nasal inspiratory flow (PNIF) in healthy volunteers.

Methods: This was a pre-post study involving 60 healthy volunteers (16 males and 44 females) aged 18–25 years old. Baseline PNIF measurements were taken before the participants performed *Jala neti* under expert supervision. PNIF was re-measured immediately after the *Jala neti* practice. Paired t-tests were used to compare pre- and post-PNIF values.

Results: The mean ± standard deviation pre-*neti* PNIF was 84.56 ± 12.56 L/min which increased significantly to 110.85 ± 12.56 L/min post-*neti* (P = 0.001). The pre- and post-PNIF values for males were 86.45 ± 12.82 and 124.25 ± 10.96 L/min, respectively (P = 0.02). For females, the values were 78.32 ± 14.52 pre-*neti* and 98.65 ± 12.78 L/min post-*neti* (P = 0.04).

Conclusion: *Jala neti* practice resulted in an immediate significant improvement in nasal inspiratory flow in healthy volunteers, suggesting that it may be a beneficial practice for enhancing nasal airflow and respiratory health.

1. INTRODUCTION

Yoga is an ancient Indian form of physical and mental exercise, breathing methods, and postures that are good for mental and physical well-being.[1] In the *Hatha Yoga* tradition, there are six cleaning techniques that are said to balance an individual's constitution, known as *Shatkarma* or *Shatkriya*, these six yoga poses are said to cleanse the entire body, hence enhancing health and well-being.[1] *Hatha Yoga Pradipika*[2] and *Gheranda Samhita*[3] outlined the *Shatkriya* technique that comes before *pranayama* (yogic breath control). *Dhauti* (internal cleaning), *Basti* (yogic enema), *Neti* (nasal cleansing), *Trataka* (focused gazing), *Nauli* (abdominal massage), and *Kapalabhati* (frontal sinus cleansing) are among the *Shatkriya* practices.[2] It ought to be used during periods of excess in *Medas* and *Kapha*.[3]

An airway cleansing method called *Neti Kriya* helps to prevent and cure disorders of the upper respiratory tract while also cleaning the nasopharyngeal tubes. There are two varieties: *Sutra Neti* (nasal irrigation using a rubber catheter) and *Jala neti* (saline nasal irrigation). Using a *Neti* pot filled with lukewarm saline water; however, some have also used honey and milk. *Neti* is helpful for disorders where *Kapha* predominates, such as sinusitis, rhinitis, rhinosinusitis, and allergic rhinitis,[1] *Jala neti* is done to cleanse the

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nasal passage.[4] This procedure pertains to the purification of the upper respiratory tract.[3]

A quick, simple, and affordable instrument for measuring nasal airflow during maximal inspiration is the peak nasal inspiratory flow (PNIF). Recent studies have found a correlation between PNIF and patient reports when the validated NOSE scale was used[5] and between PNIF and nasal obstruction in patients with varying nasal pathologies. It has also shown good reproducibility and correlation with rhinomanometry and acoustic rhinometry.[6]

In this study we aim to demonstrate the immediate effect of *Jala Neti kriya* on the Nasal airflow among healthy individuals, using PNIF.

2. METHODS

2.1. Participants

A total of 60 healthy volunteers (16 male + 44 female) were included in the study with an age group between 18 and 25 years old (group mean ± standard deviation (SD), 22.0 ± 2.02 years), they were chosen from the entry of outpatient department who visited with the willingness of learning *yoga* practices at Government Yoga and Naturopathy Medical College Hospital, Chennai. The participants were instructed to practice *Jala Neti* (nasal irrigation) under the supervision of an expert, and data were collected.

2.2. Inclusion

The healthy volunteers willing to participate in the study were included in the study.

2.3. Exclusion

The people who are suffering from any chronic illness and are under medications, are pregnant and lactating mothers, have recent nasal/ any surgical history, respiratory infections, and are not willing to participate were excluded from the study.

2.4. Design

This study was planned as a pre-post design, from the 60 health volunteers the baseline data of nasal peak inspiratory flow was measured immediately before and after the practice of *Jala neti*.

2.5. Assessment

A brief explanation was provided to the participants on the *Jala neti* practice, including the technique and precautions, the significance of the study, and the PNIF procedure. Then the baseline and post-PNIF data were collected immediately after the *Jala neti* practice.

2.5.1. PNIF

The maximal airflow through both nostrils during maximum forceful nasal inspiration is measured by PNIF. PNIF is a simple-to-use, affordable, quick, and accessible tool.[7] The Wright peak flow meter was modified to create the PNIF, which Youlten introduced in 1980. The patient wears a face mask over their nose while keeping their lips closed and without touching it. Starting at the point of a complete expiration, the patient must be encouraged to inhale as forcefully and quickly as possible through the mask while keeping his mouth closed (residual volume examination).

Typically, three maximum inspirations that are adequate are acquired, with the greatest result regarded as the PNIF. Standing is the best position to evaluate PNIF because similar to PEF tests, standing increases PNIF, particularly in females, compared to sitting. It is crucial to give the patient several tries before taking the three measures since PNIF rises with practice, especially after the initial effort. Men have higher PNIF than females do as adults, and it rises with height but has a lot of residual variability eventually lowering with age.[8] A diaphragm within the cylinder moves in response to airflow, and the highest peak flow is measured on a scale from 30 L/min to 370 L/min.[9]

2.6. Intervention

Neti is a technique to cleanse the nasal passages.[3] Usually, *Jala neti* is done using a metallic, plastic, or porcelain *neti* pot with a water-pouring nozzle.[10] The process is to combine half a liter of water with one teaspoon of pure, unionized salt (an isotonic solution). Then, turn the head slightly sideways and carefully place the pot's nozzle inside one of the nostrils. From one nostril, the water will pass through and out, making a circular pattern. This requires that you not breathe in, laugh, or speak. Blow your nose and clear your throat after completing this step. Just begin with the other nostril and repeat the process. Keep the mouth open while the water flows in the nostrils. In addition, the stomach needs to be empty before doing *Jala neti*. The nose must be dried immediately after completing the procedure.[11]

2.7. Data Extraction

The data were entered and extracted using a Microsoft Excel sheet, the highest value among the three attempts was considered for data analysis.

2.8. Data Analysis

Data expressed as mean and SD. Paired t-test was done to compare the mean difference after intervention. R statistical software (version 4.0.2) was used for the statistical analysis. $P < 0.05$ set as a significant.

3. RESULTS

The demographical details of the study participants are presented in Table 1. The mean pre-*neti* PNIF rate was 84.56 ± 12.56 L/min, which increased substantially to 110.85 ± 12.56 L/min post-*neti* ($P = 0.001$), indicating a statistically significant difference [Table 2]. When analyzed by gender, the pre-*neti* and post-*neti* PNIF values for males were 86.45 ± 12.82 L/min and 124.25 ± 10.96 L/min, respectively ($P = 0.02$). Similarly, for females, the PNIF rates improved from 78.32 ± 14.52 L/min pre-*neti* to 98.65 ± 12.78 L/min post-*neti* ($P = 0.04$). Both gender groups exhibited a significant increase in PNIF rates after performing *Jala neti*.

4. DISCUSSION

The present study shows that *Jala neti* practice has improved the nasal inspiratory flow. *Jala neti's* potential in treating sinusitis, nasal polyps, upper respiratory tract infections, and sino-nasal aspergillosis has garnered significant interest from doctors, ENT experts, and veterinarians in recent years.[10] In a comparative study (Shashikiran H, C. 2018) *Jala neti* has been found to significantly reduce symptoms of chronic rhino sinusitis, including coughing, sneezing, runny nose, post-nasal discharge, and thick nasal discharge. It dissolves and expels mucus accumulated in the nasal cavity, strengthening the body's defences against upper respiratory infections and nasal congestion.[12] A case report (Rajbhoj, P. H., 2021) investigating the *Jala neti* effects on chronic allergic rhinitis, suggests that regular *Neti Kriya* practice can prevent allergic sensitization by keeping the nose free of allergens, potentially replacing immunotherapy treatments

and aiding desensitization.[13] Another case report (Rastogi, S., and Verma, A. 2022) investigated the *Jala neti* effects; and reported that a non-COVID diabetic patient was treated with *Jala neti*, a saline nasal irrigation technique, to delay anti-fungal medication. The patient experienced sudden swelling, headache, and possible rhino-orbito-cerebral mucormycosis. Six *Jala neti* sessions over 4 days nearly completely relieved symptoms, suggesting *Jala neti's* potential to reduce sinus inflammation and illness severity.[10] *Neti* enhances blood circulation, nasal drainage, and foreign body removal. It soothes eyes, enhances memory, focus, and cognitive abilities, and lowers anxiety and depressive symptoms. *Neti* also maintains secretory and drainage systems, preventing ailments such as sinusitis, colds, coughs, allergic rhinitis, and olfactory insensitivity.[3] The amounts of histamine and leukotriene in nasal secretions were considerably lowered[3] that results in allergies.[14] Salt (lukewarm saline) in water can reduce mucosal membrane irritation by ensuring water's osmotic pressure matches bodily fluids. It also facilitates mucus discharge drainage and helps clear nose blockage by causing vasodilatation and it helps restore a lost sense of smell by increasing the olfactory nerve's sensitivity.[14] *Jala neti* practice before asana enhances upper respiratory tract secretion cleaning, viral load reduction, mucociliary clearance, inflammatory mediator's reduction, sinus blockage prevention, and reduces upper respiratory tract infection recurrence by improving nasal mucosa sensitivity to allergens.[15]

However, this study has some limitations due to the inclusion of healthy participants, as not all individuals may experience the same effects. However, adding salt may cause moderate headaches and nasal irritations, and improper nasal drying following *Jala neti* practice may also cause these adverse effects.

5. CONCLUSION

This study showed there were significant changes after the *Jala neti* practice in Nasal airflow among the healthy volunteers, which can be considered a beneficial practice for enhancing nasal airflow and respiratory health, and further studies with randomization can be done among other populations will help to correlate with the present findings.

6. ACKNOWLEDGMENTS

Nil.

7. AUTHORS' CONTRIBUTIONS

All the authors contributed equally to design and execution of the article.

8. FUNDING

Nil.

9. ETHICAL APPROVALS

Ethical approval was taken from the institutional ethics committee of Government Yoga and Naturopathy Medical College and Hospital, Chennai. *GYNMC/2015/04 Department of Yoga.* A signed informed consent was taken from each participant before collecting the baseline data.

10. CONFLICTS OF INTEREST

Nil.

11. DATA AVAILABILITY

This is an original manuscript and all data are available for only review purposes from principal investigators.

12. PUBLISHERS NOTE

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Table 1: Demographic profile of the study participants

Details	N (60)	Mean	SD
Gender			
Male	16 (n)	7.91	11.17
Female	44 (n)	21.45	2.06
Age			
Male	16 (n)	22.9	2.03
Female	44 (n)	21.6	1.94
Total	60 (n)	22.0	2.02

SD: Standard deviation

Table 2: PNIF before and after intervention among the participants

Variables	Pre-value (mean±SD)	Post-value (mean±SD)	*P* value
PNIF (L/min)	84.56±13.25	110.85±12.56	0.001
Male PNIF (L/min)	86.45±12.82	124.25±10.96	0.02
Female PNIF (L/min)	78.32±14.52	98.65±12.78	0.04

PNIF: Peak nasal inspiratory flow, SD: Standard deviation