IMPROVEMENT IN RESPIRATORY FUNCTIONS AFTER ALTERNATE NOSTRIL BREATHING IN HEALTHY YOUNG ADULTS

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Background: The ancient Indian practice of 'Pranayam' is clamed to improve pulmonary functions. Alternative Nostril Breathing (ANB) is a relatively less studied part of prayanam with regard to pulmonary functions. **Methods:** We investigated the effect of ANB on Peak Expiratory Flow Rate (PEFR) and Forced Expiratory Flow$_{25–75\%}$ ($FEF_{25–75\%}$) before and after 4 months of practice of ANB in young healthy 20 male and 20 female subjects. **Results:** PEFR rose significantly (p<0.0001) from 3.49±1.63 to 6.12±1.56 L/sec in males from 3.08±1.35 to 4.11±1.28 L/sec in females after practicing this nostril breathing exercise for a duration of four months. Even $FEF_{25–75\%}$ rose significantly (p<0.0001) from 2.61±1.10 to 4.47±1.04 L/sec in males and from 2.39±0.86 to 3.67±0.83 L/sec in females. **Conclusion:** The results suggest that regularly practicing ANB from a young age can cause positive improvement in pulmonary functions.

Keywords: Yoga, Alternate nostril breathing, PEFR, $FEF_{25–75\%}$

INTRODUCTION

Ancient yogic texts have described a rapid breathing cleaning practice as stimulating and slow regulated breathing, particularly through alternate nostrils (Nadisuddhi Pranayama) as calming.[1] The yogic discipline of pranayama is clamed to have a toning effect on respiratory system[2] and creates an equilibrium between psycho and somatic aspects of body functions.[3]

Kayser[4] defined nasal cycle as a phenomenon of alternating congestion, decongestion response of erectile tissues of nasal turbinate and septum of two nostrils, which effectively altered the unilateral nasal resistance and was existent on account of prevailing sympathetic and parasympathetic tone.

The present study was, therefore, undertaken to investigate the effect of alternate nostril breathing on respiratory functions in healthy young adults. PEFR and $FEF_{25–75\%}$ were selected as indicators of respiratory functions as these are useful in early diagnosis of ventilator abnormalities.

MATERIAL AND METHODS

The study was conducted on 40 healthy young medical students in the age group of 17–22 years. The experimental protocol was explained to them and consent obtained. The procedures were non-invasive and study plan was approved by the ethics committee of the institution, Government Medical College Kota, for a duration of six months. All the subjects were free from respiratory ailments and were not on any medication. Smokers were excluded from the study. The subjects were of same socio-economic and nutritional status as they hailed from middle class society sharing common hostel accommodation and food.

Experimental Protocol

Three to 5 students (male or female) reported daily in the laboratory. Height, weight, age and dietary habits were recorded. Body mass index was calculated. Alternate nostril breathing was done in sitting posture and subject followed the instruction given below.[5]

We asked students to sit in a calm, quiet airy place in an easy and steady posture with the head, neck and trunk erect and in a straight line in order to keep the body still. Asked them to bring the right hand up to the nose fold, the index and middle finger in a way so that the right thumb closed the right nostril and the ring finger closed the left nostril (Vishnu Mudra).[6]

With the right nostril closed by the right thumb, we asked them to exhale completely through the left nostril. The exhalation should be controlled and free from exertion and jerkiness. At the end of the exhalation we told them to close the left nostril with the ring finger, and open the right nostril and they inhaled solely and completely. We explained them that the inhalation should be smooth, controlled and of the same duration as exhalation. The subjects were asked to repeat this cycle of exhalation through right nostril, exhale completely through the same nostril keeping left nostril closed with ring finger.

At the end of this exhalation process they closed the right nostril and inhaled through the left nostril and repeated the process for next cycle.

For the first few days, the exercise was performed for 5, 10 and 15 minutes to evaluate the exercise tolerance of the subjects. The maximum changes occurred after 10 minutes and thereafter subjects began to get tired. Hence, the subjects were asked to practice ANB for 10 minutes time twice daily for four months duration.

Peak expiratory flow rate (PEFR) and Forced expiratory flow$_{25–75\%}$ ($FEF_{25–75\%}$) were measured by MEDSPIROR at the beginning and after

4 months of ANB. Initial and final values were compared by paired Students *t*-test.

RESULTS

Table-1 shows the height, weight, body surface area and body mass index of the subjects. The data conform to the values expected in young adults.

Table-2 shows a highly significant (p<0.0001) increase in PEFR and $FEF_{25–75\%}$ in both males and females after practicing alternate nostril breathing for four months.

Table-1: Height, Weight, Body Surface Area and Body Mass Index of the subjects (Mean±SD)

	Males (n=20)	Females (n=20)
Height (Cm)	166.05±5.79	151±7.78
Weight (Kg)	52.21±9.19	42.6±5.5
BSA (m^2)	2.74±0.05	2.57±0.3
BMI (m/kg^2)	18.85±2.23	18.61±3.19

Table-2: PEFR and $FEF_{25–75\%}$ before and after 4 ANB in males and female subjects (Mean±SD)

	Males (n=20)		Females (n=20)	
	PEFR (L/sec)	$FEF_{25–75\%}$ (L/sec)	PEFR (L/sec)	$FEF_{25–75\%}$ (L/sec)
Initial	3.49 ±1.63	2.61 ±1.10	3.08 ±1.35	2.39 ±0.86
After 4 months of ANB	6.12 ±1.56*	4.47 ±1.04*	4.11 ±1.28*	3.67 ±0.83*

*Significantly higher as compared to the initial values (p<0.0001)

DISCUSSION

In the present study, PEFR and $FEF_{25-75\%}$ rose significantly after 4 months of exercise as thoraco-pulmonary compliance rose well above the basal level due to training in ANB. Reportedly, relaxation of smooth muscles of the larynx and tracheobronchial tree modulates airway calibre and reduces airway resistance.[7]

Previously authors have reported that Yogic exercise increases PEFR through following respiratory dynamic changes[8]

a. By increasing respiratory muscle strength by breathing exercise.
b. By cleaning of airway secretions.
c. By using the diaphragmatic and abdominal muscle more for filling the respiratory apparatus more efficiently and completely.
d. Inhibiting the constrictor tone of bronchial smooth muscles by relaxing respiratory muscles.

We have studied PEFR and $FEF_{25–75\%}$ as these are the first parameters to decline on many respiratory diseases. Healthy persons expire 70–90% of FVC in the first second of the test which means that they take about 5 second to expire the last 10–30% of the FVC.[9]

Any practice that increases PEFR and $FEF_{25–75\%}$ is expected to retard the development of chronic obstructive pulmonary diseases. Our results show the positive impact of ANB on PEFR and $FEF_{25–75\%}$ in young adults.

It is reasonable to conclude that regularly practicing ANB from young age can lead to significant improvement in respiratory functioning, and can prevent or delay obstructive pulmonary disease in later life.

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