

STUDY ON IMPROVEMENT OF LUNG CAPACITY IN SMOKERS THROUGH
PRANAYAMA (BHASTRIKA)

Dr. Rohan Verma*

P.G. Scholar, P.G. Dept. of Kriya Sharir, PGIA, Jodhpur.



*Corresponding Author: Dr. Rohan Verma

P.G. Scholar, P.G. Dept. of Kriya Sharir, PGIA, Jodhpur.

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ABSTRACT

Ayurveda mentions the best definition of human physiology, i.e., equilibrium of the body, which is maintained by the process of Pranayama. Pranayama is the conscious awareness of breath, the life force that energizes and relaxes the body. This term is derived from the Sanskrit "Prana," meaning life force, and "Ayama," meaning extension. It is an ancient Yoga technique. Pranayama is a type of yogic practice that produces many systemic and psycho-physical effects in the body—regular, slow, and forceful inspiration for a longer duration. The Pranayama strengthens the respiratory tract and increases lung capacity. In texts like the Bhagavad Gita and the Yoga Sutra of Patanjali and later in Hath Yoga, it means the complete suspension of breathing.

KEYWORDS: Pranayama, Smoking, Bhastrika Pranayama, Smokers.

INTRODUCTION

आचार्य शार्ङ्गधर ने भी श्वसन प्रक्रिया का वर्णन किया है

The *Pranavayu* living in the *Nabhi* (between the *Pakwashaya* and the *Aamashaya*), touching the inner part of the heart, comes out of the gullet or respiratory tract to drink the nectar of *Vishnupad* (*Akasha*) and after drinking the nectar of the sky (*Pranavayu*) soon then it enters the body. In this way, keeping the whole body satisfied and happy throughout life, keeps on illuminating the *Jatharagni*.^[1]

नाभिस्थ प्राणपवनः स्पृष्ट्वा हृत कमलान्तरम् | कंठोद
बहिर्विनिर्याति पातुं विष्णुपदामृतम्

पीत्वा चाम्बरपीयूषम् पुनरायाति वेगतः प्रीणयन् देहमखिलं
जीवयञ्जठरानलम् ||

(शा.पू. 5/51)

In the modern aspect, there are some volumetric parameters for healthy lungs.

- Tidal volume - The volume of air inspired/expired by an individual per respiratory excursion at rest—500 ml
- Inspiratory reserve volume (IRV) – 2000 - 3000 ml
- Expiratory reserve volume (ERV) – 1000ml
- Residual volume (RV)- after even the severest expiratory effort, the lungs still contain some air called residual volume

To maintain this volume, *Pranayama* and a healthy lifestyle are important.

Etymology of Srotas:- The word "Srota" is derived from the Sanskrit word root "Sru Sravane." It means to ooze, to exude, to filter, to permeate.

Srotas is derived from the root word "Sru Srawane," meaning exuding, oozing, filtering, and permeating.

Srotas in Charaka Samhita

Lo/kkrqleo.kkZfu o`ÜkLFkwykU;.kwfu p A
lzksrkafI nh?kkZ.;k—R;k çrkul-'kkfu p AA

Acharya Charaka clarifies it as the number of matters or *Bhava* are present in the body, and the same number of *Srotas* are present in the body. This is why he says that *Srotas* are infinite in number. The number of matters or *Bhava* are present in the body, and the same number of *Srotas* are present in the body, which is why he says that *Srotas* are infinite. There are 16 *Murtimanat Bhava* in the body: *Prana*, *Anna*, *Udaka*, *Rasadi Saptadhatu*, *Trimala*, and *Tridosha*. Each *Bhava* presents its own *Srotas*. All these *Srotas* were organized together to form a separate entity called *Purush*. All these *Bhava* of the *Purush* neither evolved nor destroyed without *Srotas*.^[2]

Specific experts believe that a person is just the cluster of innumerable *Srotamsi* because of their pervasiveness and

the diffusiveness of agents that aggravate or pacify *dosha*.

Srotas in Sushruta Samhita

ewykr~ [kknUrja nsgs çl'ra RofHkokfg ;r~ A
L=ksrLrnf r foKs;a fljk/kefuoftZre~ AA

$\frac{1}{4}$ lq-'kk-
9/13½

Acharya Sushruta described Srotas as the channels of the body that originate from vacant spaces and spread throughout the body. Still, at the same time, they are different from Sira Dhamani.^[3]

Srotas in Ashtanga Sangraha and Hridaya

lzksrkaf l ukflds d.kkSZ us=s ik,okL;esgua AA
LrukS jäiFk'psfr ukfj,kkef/kda =;aA

thfork;rukU;Ur% lzksrkaL;kgqL=;ksn'kA
çk.k/kkrqeykEHkks-UuokfgU;fgrlsoukr~A
rkfu nq"Vkfu jksxk; fo'kq)kfu lq[kk; p AA

$\frac{1}{4}$ v-g-'kk-
3/41&42)

Acharya Vagbhatta has described Srotas, Sira, and Dhamani in both texts, i.e., *Ashtanga Sangraha* and *Ashtanga Hridayam*.^[4]

According to Acharya Vagbhatta - Srotas are of two types, i.e.

i. Visible

- In the male, visible Srotas are 9 in number, i.e., two nostrils, two ears, two eyes, one anus, one mouth, and one urethra.
- In women, three more Srotas are present in body 2 in breasts and the vagina, i.e., 12 Srotas are current.

ii. Invisible

These Srotas provide essential functional support to life. These are 13 in number: *Pranavaha Srotas*-1, *Annavaha Srotas*- 1, *Udakavaha Srotas* 1, *Dhatuvaha Srotas*-7, and *Malavaha Srotas*-3

Table 1: Srotasa classification as per Acharya Vagbhatta.

Bahirmukha Srotas (protasis which has an opening externally)	Antarmukha (Srotas, which has a space internally)
Nasika(nostrils)- 2	Pranavaha Srotas -1
Karna(ears) - 2	Rasadidhatu Vaha Srotas - 7
Netra(eyes) - 2	Mutravaha – 1
Guda marga (Anus) - 1	Swedavaha – 1
Mutra marga (Urinary orifice) - 1	Jalavaha – 1
Mukha (Oral cavity) - 1	Malavaha – 1

BHASTRIKA PRANAYAMA

The practice

Pranayama practices four essential aspects of breathing, such as

- Puraka (inhalation),
- Rechaka (exhalation),
- Antah kumbhaka (internal breath retention), and
- Bahih kumbhaka (external breath retention).

Benefits of Bhastrika Pranayama

- ❖ It will balance excessive Vata, Pitta (when practiced gently), and Kapha
- ❖ It does Ama Pachana (toxins)
- ❖ It does Pranavaha Srotasa Shodhana (cleanses and rejuvenates the lungs)
- ❖ Increases lung capacity.
- ❖ Tones the muscles of the heart, bronchial tree, diaphragm, and abdomen
- ❖ Helps to strengthen the heart and lungs.
- ❖ Improves oxygenation of the blood.
- ❖ Facilitates the removal of carbon dioxide.
- ❖ It does Agni Deepana (kindles the digestive fire). Therefore improving appetite and digestion capacity.
- ❖ Cleanses the nasal passages, sinuses, and chest of excess mucus.
- ❖ Improves circulation.
- ❖ Balances and strengthens the nervous system.
- ❖ Induces a sense of peace, tranquility, and focus.

- ❖ Promotes vigor and vitality in the mind and body.
- ❖ This Pranayama removes blockages from the nose and chest when done regularly.
- ❖ All the benefits of Pranayama.

AIMS AND OBJECTIVES

60 volunteers were included in this study. They are smoker volunteers.

A trial of 6 months was conducted, which gradually increased to 2 to 5 minutes of Pranayama (Bhastrika), and specific Yoga was given. Before and after effects of Pranayama (Bhastrika) on lungs in 6 months assessed.

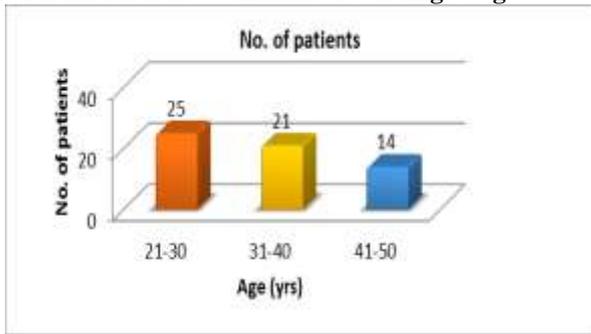
Average blood pressure and heart rate assessed before and after Pranayama (Bhastrika) in a given period.

Tools

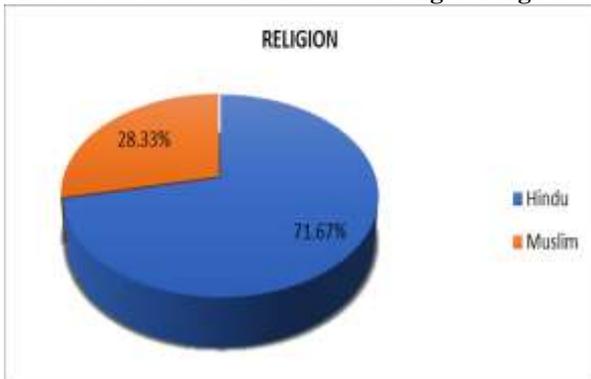
- ❖ Spirometer
- ❖ pulse oximeter
- ❖ X-Ray
- ❖ BP Instrument
- ❖ Incentive Spirometer

OBSERVATION

1. Distribution of 60 smokers according to age



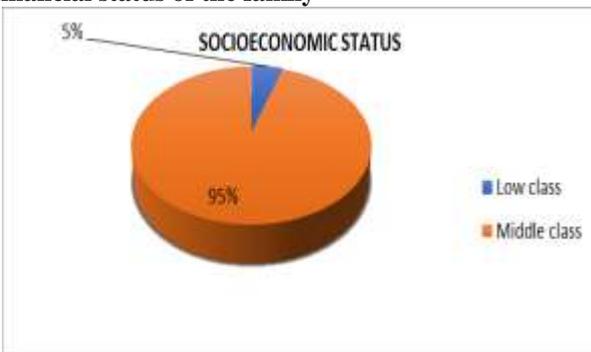
2. Distribution of 60 smokers according to religion



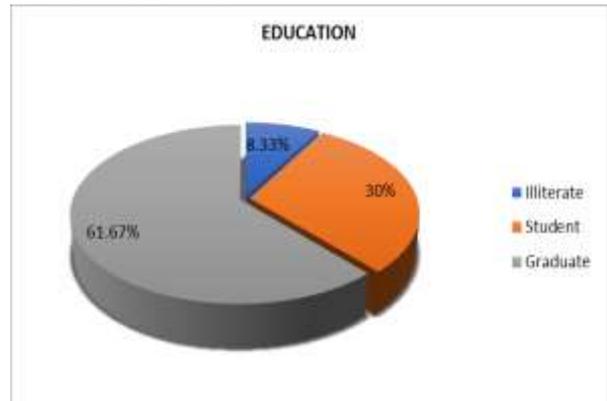
3. Distribution of 60 smokers according to the marital status



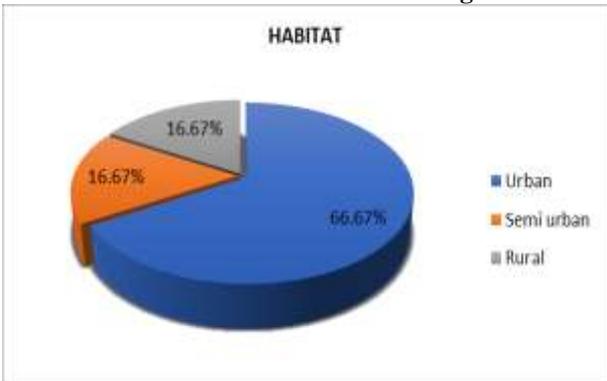
4. Distribution of 60 smokers according to the financial status of the family



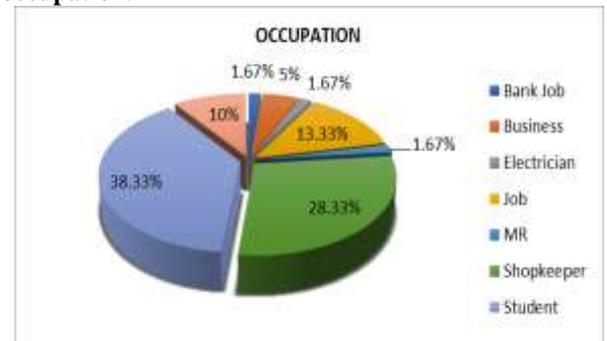
1. Distribution of 60 smokers according to education status



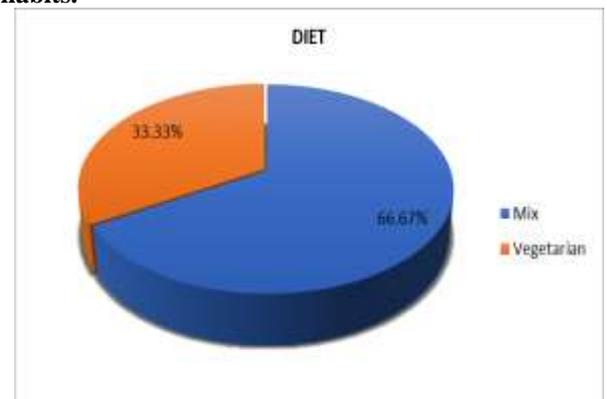
2. Distribution of 60 smokers according to habitat



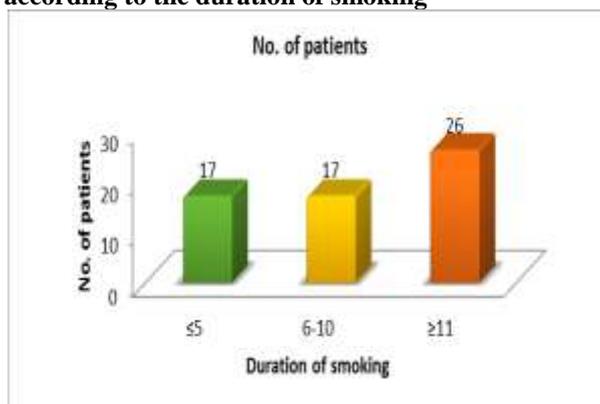
7. Distribution of 60 smokers according to occupation.



8. Distribution of 60 smokers according to food habits.



9. Distribution of 60 smokers according to the duration of smoking



RESULT

	N	Mean±SD		Mean difference	Difference %	w value	p-value	results
		BT	AT					
Cough type	54	2.26±1.02	1.85±1.02	0.416	18.4	325	<0.0001	Sig.
Duration of cough	54	2.15±1.20	0.9±1.38	1.256	58.13	435	<0.0001	Sig.
Type of phlegm	48	0.91±0.69	0.55±0.69	0.366	40.21	231	<0.0001	Sig.
Colour of sputum	48	0.9±0.57	0.5±0.53	0.4	44.44	253	<0.0001	Sig.
Quantity of sputum	48	1.21±0.86	0.6±0.76	0.616	50.9	414	<0.0001	Sig.
Consistency of sputum	48	1.11±0.73	0.56±0.69	0.55	49.54	309	<0.0001	Sig.
Dyspnea's degree of severity	36	1.11±1.10	0.88±1.01	0.233	20.99	94	0.013	Sig.
Dyspnea's duration	36	1.45±1.36	1.05±1.41	0.389	26.82	91	0.0002	Sig.
Dyspnea's relation with exertion	36	0.75±0.83	0.41±0.59	0.333	54.66	105	0.0001	Sig.
Wheezing degree of severity	39	0.85±0.75	0.6±0.66	0.25	70.58	120	<0.0001	Sig.
Degree of pitch	39	0.68±0.56	0.5±0.53	0.183	26.91	77	0.004	Sig.
Duration of wheezing	39	1.61±1.35	0.88±1.35	0.733	54.65	190	<0.0001	Sig.
Chest pain's degree of severity	24	0.47±0.60	0.35±0.55	0.116	24.68	28	0.097	NS
Duration of chest pain	24	0.83±1.18	0.60±1.09	0.233	28.07	45	0.003	Sig.
Chest pain related to exertion	24	0.75±1.10	0.40±0.81	0.35	53.33	45	0.003	Sig.
Chest pain related to smoking	24	0.61±0.85	0.36±0.71	0.25	40.32	55	0.002	Sig.
Tightness in the chest related to smoking	12	0.4±0.80	0.18±0.53	0.216	52.5	21	0.31	Sig.
Duration of tightness in the chest	12	0.4±0.86	0.26±0.68	0.133	33.25	6	0.25	NS
Degree of severity of sore throat	42	0.81±0.70	0.41±0.53	0.4	49.38	171	<0.0001	Sig.
Duration of sore throat	42	1.61±1.35	0.66±0.16	0.95	59	276	<0.0001	Sig.
Sore throat related to smoking	42	1.56±1.14	0.7±1.12	0.866	55.51	300	<0.0001	Sig.
Duration of <i>alpa swasa</i> shortened breathing	12	0.18±0.59	0.11±0.45	0.066	36.66	3	0.5	NS
Period of <i>atisrama swasa</i>	18	0.55±0.92	0.2±0.70	0.35	63.63	91	0.0002	Sig.
<i>Sashula swasa</i>	36	1.58±1.26	0.86±1.32	0.716	45.31	210	<0.0001	Sig.

Conclusions of Investigations

- ❖ Spirometer: *Pranayama (Bhastrika)* has significantly improved FVC, FEV₁, FEV₁/FVC
- ❖ Pulse oximeter: *Pranayama (Bhastrika)* has a highly significant result in improving oxygen saturation

levels.

- ❖ X-Ray: *Pranayama (Bhastrika)* has no significant result in changing the visuals on X-rays.
- ❖ Blood pressure: *Pranayama (Bhastrika)* significantly lowers SBP and heart rate.

- ❖ Incentive spirometer: *Pranayama (Bhastrika)* has no significant result in changing the results seen on Respiratory exercisers.
- ❖ *Pranayama (Bhastrika)* has significant results in improving lung capacity.

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