

## Effect of Pranayama on Breath Holding Time of College Students

Dr. Shri Krishna Patel<sup>1</sup> and Sanjay Srivastava<sup>2</sup>

<sup>1</sup>Professor, Department of Education Training, D.A.V. Training College, Kanpur, Uttar Pradesh, INDIA.

<sup>2</sup>Assistant Professor, Department of Education Training, D.A.V. Training College, Kanpur, Uttar Pradesh, INDIA.

<sup>1</sup>Corresponding Author: [gooddo.kris@gmail.com](mailto:gooddo.kris@gmail.com)

ORCID

<https://orcid.org/0000-0002-1223-0159>



[www.ijrah.com](http://www.ijrah.com) || Vol. 4 No. 2 (2024): March Issue

Date of Submission: 12-03-2024

Date of Acceptance: 21-03-2024

Date of Publication: 31-03-2024

### ABSTRACT

**Context:** Pranayama is a method for regulating and manipulating breath and meditation. It enables individuals to achieve a state of profound relaxation while maintaining mental alertness. Recent research on the effects of yoga on the respiratory system over the long term has shown promising results.

**Aim:** This study's primary objective was to assess pranayama's impact on breath holding time.

**Settings and Design** The present investigation entail the examination of a group of 25 male participants who exhibited good health and fell within the age range of 21 to 26 years.

**Methods and Material:** The participants who met the specified inclusion and exclusion criteria were subjected to a 15-minute pranayama session facilitated by a yoga instructor over a period of 12 weeks. Respiratory functioning before and after yoga was assessed using measurements of breath-holding duration. The parameters were analyzed using the student t-test.

**Results:** The breath-holding duration have shown a notable increase compared to the period before engaging in yoga practice.

**Conclusions:** The findings of this study demonstrate the positive impacts of consistent engagement in pranayama on respiratory functioning.

**Keywords-** pranayama, breathing holding time, respiratory efficiency.

## I. INTRODUCTION

As the science of proper living, yoga is meant to be incorporated into daily life since it is designed to be practiced in this manner. Its healing properties affect all parts of a person, including the physical, vital, mental, emotional, psychic, and spiritual. Through yoga, the many bodily processes are brought into perfect synchronization with one another to function for the entire body's benefit. [1,2]

Overcrowding and rising pollution are two problems plaguing modern society, particularly in metropolitan areas. These problems are a direct result of fast industrialization and enormous population expansion. Lung function is an essential measurement when

determining the severity of chronic respiratory and systemic inflammation and the risk of premature cardiorespiratory morbidity and death. The same consequences have been linked to pollution in the surrounding air supply. Consequently, the function of the lungs is an essential component in assessing the impacts of pollution in the surrounding air. [3,4] Contaminants such as diesel exhausts, which include free radicals or highly oxidative gases (such as oxygen-3 or nitrogen oxides), are among the pollutants found in the ambient air. The production of reactive oxygen species from lung cells causes other lung cell components to be attacked and oxidized when they come into contact with inhaled particles. These particles contain hazardous chemicals, such as adsorbed metals. [5]

The existing body of literature has demonstrated the detrimental impacts of exposure to ambient air pollution on a range of physical illnesses among adolescents. Nevertheless, there needs to be more evidence on the long-term exposure to various levels of air pollution in India, with just a few studies conducted in Delhi and Lucknow. Kanpur is a heavily polluted city in Uttar Pradesh. [6,7]

A growing body of evidence suggests that yoga practices have been linked to increased longevity and therapeutic and rehabilitative effects. The positive impact of practicing various pranayama's for six weeks has been extensively documented and is supported by solid scientific evidence. When combined with asanas, different pranayama techniques elicit distinct physiological responses in healthy young individuals. Research suggests that engaging in breathing exercises for three weeks can have a significant impact on cardiorespiratory and autonomic functions. Reference All of these studies examined the effects of individual pranayama or meditation practice for a duration ranging from three weeks to six months. [8,9,10,11,12] This study aimed to investigate the impact of pranayama on respiratory parameters:

## II. METHODOLOGY

A sample of 25 male volunteers, aged between 21 and 26 years, who were in good health, was chosen using a simple random sampling procedure from a larger group of participants. The study comprised participants between the ages of 21 and 26 who were in good health and did not appear to have any significant medical conditions. The study excluded individuals with a medical history of respiratory disorders, cardiovascular problems, or diabetes. Furthermore, the study excluded people with neurological issues who could not perform pulmonary function tests. Participants who engaged in smoking, alcohol use, or drug use were excluded from the study after obtaining their medical history. The participants were provided with an explanation of the significance and methodology of the research. Before recording any research parameters, participants were required to read and sign an informed consent form. The research encompassed non-invasive methodologies that did not impose any financial strain on the participants. Adequate time was allocated for the participants to engage in mental and physical relaxation before the collection of parameters. The criteria above were documented for each participant, and the data pertaining to each individual participant was recorded in a proforma format.

**Breath holding time:** During the measurement of breath holding, the researcher directed the participant to assume a comfortable seated position on the chair. The participant was instructed to inhale deeply while the nose clip was

securely fastened to the nose and the lips were tightly closed. Efforts were made to prevent air leakage from the oral cavity and nasal passages during inhalation and exhalation. The individual was instructed to sustain the act of holding their breath for as long as possible. If he had challenges sustaining the act of breath-holding, he was promptly instructed to remove the hand from the chest. The duration of the subject's breath-holding ability was measured in seconds.

**Scoring:** The breath-holding capacity of each individual was measured three times using a stopwatch. The ultimate measurements were derived from the most optimal of the three readings.

The participants received yoga instruction from a certified teacher for twelve weeks. This training encompassed of three pranayama techniques: Nadi shodhan, Bhastrika, and Bhramari. The participants were instructed in the following yoga techniques daily for a duration of two months:

1. **Nadishodhan:** Right thumb closes right nostril. Now, slowly inhale via the left nostril to fill your lungs. The correct ring finger should shut the left nostril after inhaling. Slowly exhale via the right nostril—Re-inhale from the right nostril and shut with the right thumb after exhaling. Slowly exhale via the left nostril. One round of Nadisukthi Pranayama. Students did Nadisuddi for five minutes a day for two months.
2. **Bhastrika:** Bhastrika means bellows in Sanskrit. During Bhastrika pranayama, the breath sounds like bellows. Bhastrika pranayama involves thorough inhalation and exhalation to maximize oxygen intake. Students practiced Bhastrika for two months for 5 minutes every day. [14]
3. **Bramhari:** Bhramar—humming black bee—is the Sanskrit term for "Bramhari". Bramhari breathing decreases tension and fight-or-flight. This pranayama requires throat sounds during exhalation and inhalation. The lengthy mmm. in Omkar sounds like Om chanting. Keep the sound deep and smooth. Students practiced Bramhari for two months for 5 minutes every day. [15]

The mean  $\pm$  standard deviation is used to present the results of continuous measurements. The assessment of significance is conducted at a significance level of 5%. The importance of research parameters before and after yoga practice was determined using a two-tailed, dependent student 't' test.

## III. RESULTS

The findings were obtained by examining 25 healthy male individuals, aged between 21 and 26, who engaged mainly in three pranayama exercises under the supervision of an instructor for 12 weeks. The findings were presented as the mean  $\pm$  standard deviation.

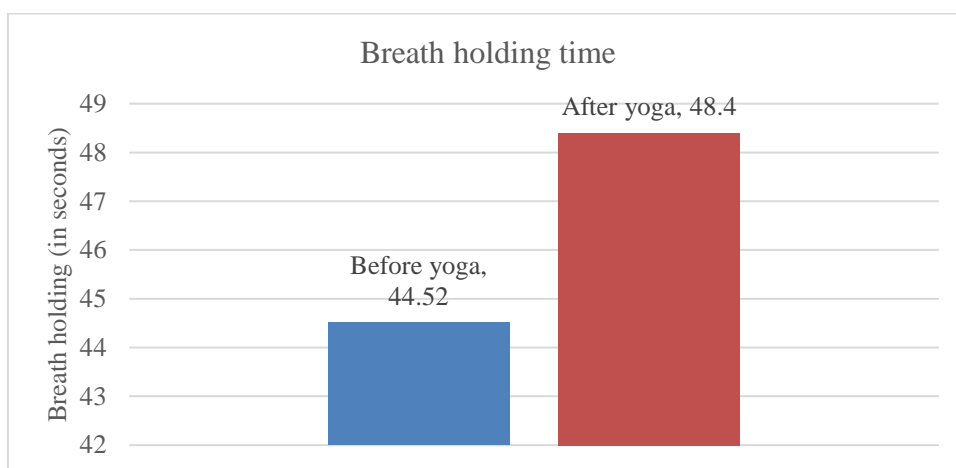
**Table 1: Effect of pranayama and meditation on Breath Holding Time (sec)**

Groups	Mean	S.D.	S.E. Mean	D.M.	S.E. Mean Difference	t-value	p-value
Before yoga practice	44.52	11.31	2.26	3.88	0.19	10.34*	.001
After yoga practice	48.40	10.38	2.07				

\*Significant at 0.05 level

Table:1 shows that the breath holding time before yoga practice ( $M = 44.52, SD = 11.31$ )

was significantly less than after 12 weeks yoga practice ( $M = 48.40, SD = 10.38$ ), ( $t(24) = 2.064, p < .001$ ).



**Figure 1: Effect of yoga on breath holding time**

#### IV. DISCUSSION

After a twelve-week Yoga training program that emphasized three specific pranayama techniques (nadi shodhan, bhastrika, and bhramari), breath-holding time was notably improved. Other studies have yielded similar findings. In a study conducted by S. Babu (1992) [16], the effects of selected yoga asanas, pranayama, and meditation on the physiological variables of male students were examined. The study's findings indicate a significant increase in the Breath Holding Time for the experimental group in the post-test, compared to the control group, following twelve weeks of practicing yoga asanas, pranayama, and meditation.

In a study conducted by Karthik PS (2014), it was discovered that various measurements such as VC, TV, ERV, BHT, 40mm endurance, and PEFR significantly increased after a two-month period of yoga training. Based on our research findings, it can be inferred that incorporating yoga into one's routine can effectively enhance pulmonary functions in individuals who are in good health. Consequently, this practice may serve as a preventive measure against respiratory ailments.

Mamatha, S. D., and Gorkal, A. R. (2012). They are investigating the impact of Savitri Pranayama's practice on peak expiratory flow rate, maximum voluntary ventilation, and breath-holding time. The study's findings indicate a significant increase in PEFR, MVV, and BHT after 12 weeks of practice compared to

the control group. The Savitri pranayama training improves lung and thorax compliance, respiratory muscle strength, and tolerance of respiratory control against higher pCO<sub>2</sub>. As a result, there is a notable increase in all the measured parameters.

#### V. CONCLUSION

Consequently, the findings of this research suggest that pranayama, when practiced on a consistent basis, has the potential to enhance pulmonary function and contribute to the enhancement of respiratory efficiency.

#### ACKNOWLEDGMENTS

We express our humble thanks to C.S.J.M. University, Kanpur, for giving us the permission to conduct this study under C.V. Raman minor project scheme. we also thank college students, for participating in this study.

#### REFERENCES

- [1] Taimni, I.K. (1961). *The science of yoga*. Quest Books. [https://www.google.co.in/books/edition/The\\_Science\\_of\\_Yoga/\\_15bBgAAQBAJ?hl=en&gbpv](https://www.google.co.in/books/edition/The_Science_of_Yoga/_15bBgAAQBAJ?hl=en&gbpv)

- =1&dq=1.%09Taimni,+I.+K.+(1961).+The+science+of+yoga.+Quest+Books&pg=PT16&printsec=frontcover
- [2] Bhavanani, A. B. (2011). Understanding the science of yoga. *International Scientific Yoga Journal*, 1, 334-344. [https://d1wqtxts1xzle7.cloudfront.net/54240008/Understanding\\_the\\_Science\\_of\\_Yoga20170824-2722-zk8oyq-libre.pdf?1503635736=&response-content](https://d1wqtxts1xzle7.cloudfront.net/54240008/Understanding_the_Science_of_Yoga20170824-2722-zk8oyq-libre.pdf?1503635736=&response-content)
- [3] Sin D, Wu L, Man S. The relationship between reduced lung function and cardiovascular mortality: a population-based study and a systematic review of the literature. *CHEST Journal*. 2005;127(6):1952-59. <https://www.sciencedirect.com/science/article/abs/pii/S0012369215497958>
- [4] Pope Cr, Dockery D. Health effects of fine particulate air pollution: lines that connect. *Journal of the Air Waste Management Association*. 2006;56(6):709-42. <https://www.tandfonline.com/doi/abs/10.1080/10473289.2006.10464485>
- [5] Li N, Wang M, Oberley TD, Sempf JM, Nel AE. Comparison of the pro-oxidative and proinflammatory effects of organic diesel exhaust particle chemicals in bronchial epithelial cells and macrophages. *The Journal of Immunology*. 2002;169(8):4531-41. <https://journals.aai.org/jimmunol/article/169/8/4531/35440>
- [6] Goyal A, Khaliq F. Pulmonary functions and ambient air pollution in residents of Delhi. *Indian Journal of Medical Specialities*, 2011; 2(2): 96-100. <https://openurl.ebsco.com/EPDB%3Aagcd%3A6%3A5540198/detailv2?sid=ebsco%3Aplink%3AAscholar&id=ebsco%3Aagcd%3A67675984&crI=c>
- [7] Barman SC, Kumar N, Singh R, Kisku GC, Khan AH, Kidwai MM, Murthy RC, Negi MP, Pandey P, Verma AK, Jain G, Bhargava SK. Assessment of urban air pollution and its probable health impact. *Journal of Environmental Biology*, 2010; 31: 913-20. <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=cd16ca4a835dbc7ce7e8d8a8fddf4a4df20d62ec>
- [8] Bharshankar JR, Bharshanker RN, Deshpande VN, Kaore SB, Gosavi GB. Effect of yoga on cardiovascular system in subjects above 40 years. *Indian Journal of Physiology and Pharmacology*, 2003; 47(2):202-06. [https://d1wqtxts1xzle7.cloudfront.net/72815723/Effect\\_of\\_yoga\\_on\\_cardiovascular\\_system\\_20211016-31047-16ailzp.pdf?1634387114=&response-content](https://d1wqtxts1xzle7.cloudfront.net/72815723/Effect_of_yoga_on_cardiovascular_system_20211016-31047-16ailzp.pdf?1634387114=&response-content)
- [9] Khanam AA, Sachdev V, Guleria R, Deepak KK. Study of pulmonary and autonomic functions of asthma patients after yoga training. *Indian Journal of Physiology and Pharmacology*, 1996; 40(4):318-24. [https://www.ijpp.com/IJPP%20archives/1996\\_40\\_4/318-324.pdf](https://www.ijpp.com/IJPP%20archives/1996_40_4/318-324.pdf)
- [10] Katiyar SK, Bihari S. Role of pranayama in rehabilitation of COPD patients – a randomized controlled study. *Indian Journal of Allergy, Asthma and Immunology*, 2006; 20(2):98-104. [https://www.researchgate.net/profile/ShaileshBihari/publication/228469117\\_Role\\_of\\_Pranayama\\_in\\_rehabilitation\\_of\\_COPD\\_patients-A\\_randomized\\_controlled\\_study/links](https://www.researchgate.net/profile/ShaileshBihari/publication/228469117_Role_of_Pranayama_in_rehabilitation_of_COPD_patients-A_randomized_controlled_study/links)
- [11] Joshi LN, Joshi VD, Gokhale LV. Effect of short-term pranayama on breathing rate and ventilatory functions of lungs. *Indian Journal of Physiology and Pharmacology*, 1992; 36(2):105-8. [https://ijpp.com/IJPP%20archives/1992\\_36\\_2/105-108.pdf](https://ijpp.com/IJPP%20archives/1992_36_2/105-108.pdf)
- [12] Madanmohan, Udupa K, Bhavani AB, Vijayalakshmi P, Surendiran A. Effect of slow and fast pranayamas on reaction time and cardiorespiratory variables. *Indian Journal of Physiology and Pharmacology*, 2005; 49(3):313-8. <http://icyer.com/documents/slow%20and%20fast%20pranayama.pdf>
- [13] [http://www.healthandyoga.com/html/pran/nadis\\_hudhi.aspx](http://www.healthandyoga.com/html/pran/nadis_hudhi.aspx)
- [14] <http://thecompleteyoga.com/pranayama/>
- [15] Saraswati, Lab manual health and physical education. Saraswati House Pvt Ltd. *Tetracycline Teratology*. 2000:79.
- [16] Babu, M. S. Effects of Selected Yogasanas, Pranayama and Meditation On Physiological Variables Of Male Students. *S. No Names of the Articles Page. No, 49*.
- [17] Karthik PS, Chandrasekhar M, Ambareesha K, Nikhil C. Effect of pranayama and suryanamaskar on pulmonary functions in medical students. *Journal of Clinical and Diagnostic Research*. 2014 Dec;8(12): BC04-6. doi: 10.7860/JCDR/2014/10281.5344. Epub 2014 Dec 5. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4316242/>
- [18] Mamatha, S. D., & Gorkal, A. R. (2012). Effect of Savitri Pranayama practice on peak expiratory flow rate, maximum voluntary ventilation and breath holding time. *Indian Journal of Research and Reports in Medical Sciences (IJRRMS)*, 2(1), 7-11. <https://www.researchgate.net/profile/Mamatha-Sd/publication/303227314>