

## YOGA AS AN EXERCISE TOOL: STUDY OF PHYSIOLOGICAL PARAMETERS OF THE HEALTHY SUBJECTS

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**Abstract: Background and Objectives:** As participation rates in mind-body fitness programs such as yoga continue to increase, it is important for health care professionals to be informed about the nature of yoga and the evidence of its many preventive and therapeutic effects. This study is to assess the findings of effects of yoga as an exercise tool and to provide a comprehensive review of the benefits of regular yoga practice. **Method:** The physiological effects on cardio-respiratory and physical parameters were recorded of healthy subjects who performed yoga under guidance for 10 weeks. **Result:** Change in physical parameters like weight etc was insignificant. Significant improvement was noted in cardiac and majority of respiratory parameters.

**Conclusion:** This study shows that yogic practices promote and improve respiratory and cardiovascular function and enhance overall well-being and quality of life.

**Key words:** Yoga, physiological parameters, healthy subjects, exercise

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### Introduction:

Yoga is classified by the National Institutes of Health as a form of Complementary and Alternative Medicine (CAM).<sup>[1]</sup> Yoga comes from the sanskrit word “Yug” which means union, specifically the union of mind, body and spirit.<sup>[2,3]</sup> Originating in Tibet and India over 3,000 years ago, Yoga is one of the world’s oldest branches of spiritual inquiry and physical exploration. Regular practice of yoga promotes strength, endurance, flexibility and facilitates characteristics of friendliness, compassion, and greater self-control, while cultivating a sense of calmness and well-being.<sup>[4,5]</sup> Sustained practice also leads to important outcomes such as changes in life perspective, self-awareness and an improved sense of energy to live life fully and with genuine enjoyment.<sup>[6-8]</sup> The practice of yoga produces a physiological state opposite to that of the flight-or-fight stress response and with that interruption in the stress response, a sense of balance and union between the mind and body can be achieved.<sup>[9]</sup> Yoga is described as a path for transcending the ordinary mind (who you think you are) in order to merge with your “Higher self” or “God self”. Yogic postures are specifically devised to endow

the vital organs to function without giving fatigue to the muscles.

Yoga is a form of mind-body fitness that involves a combination of muscular activity and an internally directed mindful focus on awareness of the self, the breath, and energy.<sup>[4]</sup> These days all over the world in intellectual circles, there is a strong desire to know more about Yoga. Sedentary lifestyles can lead to back pain, stiffness, and lack of quality sleep, constipation, weakness, obesity and depression. Inactivity can also be a factor in heart disease, osteoporosis and stiffness around joints. This leads to lesser mobility and a vicious downward spiral. Yoga can be a key out of this cycle. Four basic principles underlie the teachings and practices of yoga’s healing system.<sup>[6]</sup> The first principle is the human body is a holistic entity comprised of various interrelated dimensions inseparable from one another and the health or illness of any one dimension affects the other dimensions. The second principle is individuals and their needs are unique and therefore must be approached in a way that acknowledges this individuality and their practice must be tailored accordingly. The third principle is yoga is self-empowering; the student is his or her own healer.

Yoga engages the student in the healing process; by playing an active role in their journey toward health, the healing comes from within, instead of from an outside source and a greater sense of autonomy is achieved. The fourth principle is that the quality and state of an individual's mind is crucial to healing. When the individual has a positive mind-state healing happens more quickly, whereas if the mind-state is negative, healing may be prolonged.

Maharshi Patanjali, father of the modern concept of Yoga, a great physician himself, in Third century B.C. described Yoga as the complete mastery of mind and emotions.

The present work is being undertaken to find out the effectiveness of Yoga as an exercise tool on physiological parameters of the healthy subjects. Yoga users report benefit for musculoskeletal conditions and mental health, indicating that further research on the efficacy of yoga for the treatment and/or prevention of these conditions is warranted.<sup>[10]</sup>

#### AIMS AND OBJECTIVES:

⇒ To study the effect of Yoga on Respiratory parameters of subjects.

⇒ To study the effect of Yoga on Cardiac parameters of subjects.

⇒ To study the effect of Yoga on Physical parameters of subjects.

In recent years, the benefits of Yoga are being more and more realized and used in prevention, control and rehabilitation of many diseases, and in the physical training of players and athletes in many parts of the world. However, in our Institute not much work has been done on this topic so far. The aim of this study is to fill this lacuna as I feel Yoga courses should be included in Vadilal Sarabhai Hospital as part of the treatment of patients. It can also endow the medical students to cope with stress while pursuing their studies.

#### Material & method:

This study was conducted on 30 cases performing regular *yogasanas* at Shri Nand Nagar Yoga Centre, Vejalpur; under the guidance of a Yoga instructor. All selected subjects were between the age groups of 20 to 50 years. Fifteen subjects, age group ranging between 20 to 50 years, selected as control group, were not performing Yoga exercises.

All 30 subjects performing regular *yogasanas* were placed in one group and they practiced Yoga for 10 weeks. All the cases were examined twice, first immediately before they started Yoga practice and then after ten weeks of Yoga practice.

The control group was also examined twice at an interval of 10 weeks. Both control group and Yoga group were examined under the following heads:

#### ⇒ CASE STUDY

##### 1. General and Systemic Examination

##### 2. Physical Parameters

Weight (kg) - I / II

Chest girth (cm) - I / II

Chest expansion (cm)- I / II

##### 3. Respiratory Parameters

Respiratory rate (/min.)- I / II

Breath holding time (sec.)- I / II

Expiratory pressure (mmHg)- I / II

Tidal volume (ml)- I / II

Vital capacity (ml)- I / II

##### 4. Cardiac Parameters

Blood pressure (mmHg)- I / II

Harward step test(%)- I / II

#### ⇒ MATERIALS

**Yoga Center** - Two Yoga centres at Shri Nand Nagar, Part-II, N-Block, Vejalpur were selected for this study.

**Yoga Exercise** - All the candidates, except control cases, performed Yoga *asanas* daily in the morning hours from 7.00 to 8.30 am at the Yoga centres, under the supervision of qualified Yoga instructors, for a period of one and a half months. Yoga exercises included:

- *Surya Namaskar* : 8 minutes
- *Sharir Sanchalan* : 15 minutes

- *Asanas* : 40 minutes
- *Pranayam* : 25 minutes
- Prayer : 2 minutes

**Human Laboratory** - Detailed physical, general and systemic examinations were conducted in human laboratory, which included cardiac efficiency tested by Harward wooden steps and respiratory parameters (tidal volume and vital capacity) recorded by simple expiratory spirometer.

#### OBSERVATION AND RESULTS:

**Table 1: Effect of yoga on physical parameters**

Examination	Control Group		Effective P Value	Yoga Group		Effective P Value
	Mean with S.D. I	II		Mean with S.D. I	II	
Weight (kg.)	63.600 ± 8.182	64.053 ± 8.679	0.8840	65.320 ± 9.886	64.713 ± 9.902	0.8131 (insignificant)
Chest Girth (cm.)	85.073 ± 3.049	85.113 ± 3.062	0.9716	87.170 ± 8.009	86.683 ± 8.232	0.8172 (insignificant)
Chest Expansion (cm.)	3.367 ± 1.488	3.400 ± 1.409	0.9502	3.570 ± 1.324	3.657 ± 1.205	0.7918 (insignificant)

**Table 2: Effect of yoga on respiratory parameters**

Examination	Control Group		Effective P Value	Yoga Group		Effective P Value
	Mean with S.D. I	II		Mean with S.D. I	II	
Tidal Volume (ml)	418.333 ± 78.755	420.000 ± 74.522	0.9529	437.500 ± 91.385	459.333 ± 83.982	0.3392 (insignificant)
Breath Holding time (sec)	41.733 ± 5.625	41.200 ± 5.441	0.7937	44.467 ± 12.199	61.267 ± 14.029	< 0.001 (significant)
Vital capacity (ml)	2416.667 ± 348.039	2390.000 ± 343.927	0.8343	2580.000 ± 477.800	2936.667 ± 442.258	< 0.05 (significant)
Expiratory Pressure (mmHg)	82.400 ± 15.733	81.733 ± 14.079	0.9035	73.667 ± 13.275	81.400 ± 14.794	< 0.05 (significant)

**Table 3: Effect of yoga on cardiac parameters**

Examination	Control Group		Effective P Value	Yoga Group		Effective P Value
	Mean with S.D. I	II		Mean with S.D. I	II	
Blood Pressure Systolic (mmHg)	128.933 ±8.102	128.400 ±6.685	0.8455	129.400 ±10.842	116.733 ±6.977	< 0.001 (significant)
Blood Pressure Diastolic (mmHg)	81.733 ±4.301	81.333 ±5.014	> 0.05	82.600 ±6.371	76.200 ±5.182	< 0.001 (significant)
Harward step test (%)	77.800 ±11.156	76.933 ±10.512	0.8282	75.600 ±9.717	82.167 ±9.717	< 0.05 (significant)

**Discussion:**

- Fifteen healthy males of age group 20-50 years (control group) were compared with 30 adults performing combined practice of several Yogasnas for 10 weeks (Yoga Group). All the cases in both the groups were males.
- The control and Yoga groups were matched for age, physical characteristics, and physical fitness.
- The time of examination for all the cases was kept constant to avoid any diurnal variations in the results.
- The examination included clinical, anthropometrics, cardiac, ventilatory and physical efficiency tests. Before and after the 10 weeks of yogic exercises, the above values were compared in both the groups.
- There was a significant increase in vital capacity, expiratory pressure and BHT. Respiratory rate decreased. Tidal volume did not show significant changes in Yoga practitioners. Changes suggest improvement in respiratory efficiency following Yoga.<sup>[12]</sup>
- There was an overall improvement of cardiac function and cardiac efficiency in the Yoga

group. Blood pressure (both systolic and diastolic) fell significantly and fitness index as assessed by “Harward step test” improved.<sup>[11]</sup>

- The Yoga group did not show any significant changes in body weight.
- Chest girth and chest expansion also did not show any significant changes in the Yoga group in comparison to the control group.

**Conclusion:**

This study concludes that yogic exercises have a great value in improving general health and physical efficiency. Its role in prevention, control and rehabilitation of many diseases is also beyond any doubts. Yoga should be popularized amongst general public as a health promoting measure. But still there is much scope of further study to evaluate specific *asanas* for improving specific parameters.

**References:**

1. Williams K, Steinberg L, Petronis J. Therapeutic application of iyengar yoga for healing chronic low back pain. *Int J Yoga Ther.* 2003;13:55–67.
3. Raub JA. Psychophysiological effects of hatha yoga on musculoskeletal and cardiopulmonary function: A literature review. *J Altern Complement Med.* 2002;8:797–812.
4. Collins C. Yoga: Intuition, preventive medicine, and treatment. *J Obstet Gynecol Neonatal Nurs.* 1998;27:563–8.
5. McCall T. New York: Bantam Dell a division of Random House Inc; 2007. *Yoga as Medicine.*
6. Desikachar K, Bragdon L, Bossart C. The yoga of healing: Exploring yoga's holistic model for health and well-being. *Int J Yoga Ther.* 2005;15:17–39.
7. Mehta S, Mehta M, Mehta S. New York: Alford A. Knoff Company; 1995. *Yoga the iyengar way.*
8. Atkinson NL, Permuth-Levine R. Benefits, barriers, and cues to action of yoga practice: A focus group approach. *Am J Health Behav.* 2009;33:3–14.
2. Lasater J. The heart of pantajali. *Yoga J.* 1997;137:134–44.
9. Arora S, Bhattacharjee J. Modulation of immune response in stress by yoga. *Int J Yoga.* 2008;1:45–55.
10. Birdee GS, Legedza AT, Saper RB, et al. Characteristics of yoga users: results of a national survey. *Journal of General Internal Medicine.* 2008; 23(10):1653–1658.
11. Dr chandrashekhara dange\*1 dr dnyanoba darade2 and dr mrs shubhangi dange3 effect of yoga on cardiorespiratory Parameters in medical students, *int j pharm bio sci* 2016 april; 7(2): (b) 772 – 775
12. Keshur A. Karmur\*, Varsha S. Joshi, Maulik S. Padalia and Jitesh L. Sarvaiya, Effect of ten weeks yoga practice on pulmonary function tests, *Keshur A. Karmur et al/ International Journal of Biomedical and Advance Research* 2015; 6(09): 682-685.

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