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## Effect Of Selected Yogic Kriya, Bandha And Pranayama On Vital Capacity And Breath Holding Time Of Sai Students Of Pondicherry State

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### **Abstract:**

*There is evidence to prove that practice of Kriya, Bandha and Pranayama improves physical performance. The present investigation was undertaken to study the effect of selected yogic practices on vital capacity and breath holding time on SAI students who had undergone 10 weeks' yoga practice programme of Kriya, Bandha and Pranayama. The suitable parameters (Spiro check P. K. Morgan Ltd, England and 40 mm Hg test) were used before and after the training programme. The results show that there is greater improvement in Vital capacity and Breath holding time in the experimental group than the Control group.*

**Key words:** Kriya, Bandha, Pranayama, Vital Capacity and Respiratory pressure

### **1.Introduction**

Yoga is a systematic process for acceleration in the growth of a man in his entirety. It is not merely a system of physical exercise or asanas but a perfect synthesis of body, mind and spirit. It is the most significant scientific technique for development of integral personality. It is the union of YUJ body, emotions, mind, Jiva-Atman, Science and art of mastering the mind, Science of right -use ness, Conscious evolution. It is a way of life, stilling the whirlpools (modifications) of the mind stuff, skill in action, equanimity of mind, and disassociation from the union with pain. According to Patanjali (300 BC), yoga means restructuring extrovert activities of the mind as a result of which the 'self' abides in its own form (Satyananda Saraswathi,1999).

The psychic changes so that a complete devotion can be the main motive of the heart and the rules of thought, life and action in constant union with the mother and in her presence. The descent of the peace, power, light etc. of the higher consciousness through the mind and heart into the whole-being occupying the very cells of the body (Sri Aurobindo 1971).

The yoga sutra of Patanjali is divided into four chapters or pada. The first deals with Samadhi and the second deals with the mean (sadhana) to achieve yoga. The third enumerates the power (Vibhuti) that the yogi comes across in his quest, and the fourth deals with the absolute (kaivalya).

Yoga has developed an eight fold path of systematic stages which sequentially scope into one another and lead to the higher level of consciousness and these make one's life more meaningful (Rajapurkar,1988).

"Yoga is awareness"; "Yoga is skill in action", says Sri Krishna to Arjuna in Srimad Bhagawad Gita and this awareness technique leads to "Yoga as conscious evolution"(Geetha Iyengar,1983).

#### *1.1.Kriya*

Kriyas are cleansing practices. 'Shat' means six and 'karma' means action. The shatkarmas consists of six groups of purification practices. The aim of Hatha yoga and therefore of the shatkarmas is to create harmony between the two major prana flows ida and pingala, thereby attaining physical and mental purification and balance (Satyananda Saraswati, 1999).

#### *1.2.Bandha*

The Sanskrit word 'Bandha' means to hold 'tighten or Lock'. This defines precisely the physical action involved in the Bandha practice and the effect on the pranic body. The Bandhas aim to lock the pranas in particular areas and redirect their flow into sushumnanadi for purpose of spiritual awakening. There are four types of bandha namely jalandher bandha, uddiyana bandha ,moola bandha and maha bandha. The first three bandhas are situated respectively in the throat, abdomen and perineum. Combination of three bandhas performing at the same time is called maha bandha . (Sutra 5. Sri Adishankaracharya)

### 1.3. Pranayama

The word pranayama is formed by two words that are 'prana' which means a subtle force or a vital energy and the word 'yama' means to control or restraint. Therefore, pranayama essentially becomes a process by which 'prana' is controlled by regulating the breathing voluntarily.

Svatmaramasuri, the author of Hatha yoga Pradipika says that "After becoming well-versed in (some) Asana, the yogi, with (his senses under) control and eating moderate agreeable food, should practise pranayama as advised by the guru"- Hatha yoga pradipika-II:I). Each cycle of pranayama is a complex voluntary act, consisting of three distinct phases (Digambargi, 1998).

In yogic literature, when the breath is held after exhalation, it is called Bahya Kumbhaka, when the breathing is stopped after inhalation, it is known as Abhyantara kumbhaka while the forth type pause as mentioned above which comes automatically after a long practice or pranayama, is known as keval kumbhaka.

Svatmaram, the author of Hatha pradepika mentions eight varieties of pranayama not on the basis of nature of kumbhaka (retention) but on the basis of nature of inhalation and exhalation, which are gone through before and after the kumbhaka (Gore, 1991).

### 2. Vital Capacity

Forced vital capacity (FVC) is defined as the maximal volume of air, which a person can expel from his lungs by a forcible expiration after the deepest possible inspiration (shaver).

Vital capacity (VC) is the sum of tidal air and the inspiratory and expiratory reserve volumes (Vemon B.Mouteastle, 1968).

Forced vital capacity (FVC) is the volume of air exhaled by a maximum forced expiration after a full inspiration (APPS, 1983).

### 3. Respiratory Pressure

Test subjects are asked to take in a full breath and blow against the mercury column to the pressure of 40mm maintaining it as long as possible. The time (in seconds) for which the subject could maintain the mercury level at 40 mm Hg is noted (Madanamohan, 1992).

### 4. Aims And Objectives

To study the effect of Yogic practice in Kriya, Bandha, Pranayama on Forced vital capacity and Peak Expiratory flow rate.

To study the effect of Yogic practice in Kriya, Bandha, Pranayama on Breath holding time.

### 5. Hypothesis

It was hypothesized that selected yogic kriya, bandha, pranayama would bring significant changes on vital capacity and breath-holding time for SAI students of Pondicherry State.

### 6. Methodology

For the experiment, 30 male students were randomly selected from SAI Hostel Pondicherry and divided into two equal groups namely Control and Experimental group each consisting of 15 subjects who carried out yogic practice for a period of 10 weeks of 1-hour duration in the morning session only. The control group was not involved in any training programme. Both control and experimental groups' vital capacity and Breath holding time were measured.

### 7. Tools

Vital Capacity was measured by using computer digital Spiro meter (Spiro check P.K.Morgon Ltd., England). Breath holding time was measured by using mercury monometer. Pre test data were collected two days before the training programme and post test data were collected two days after the training programme.

### 8. Results

Group	Mean Scores		Analysis of Variance				
	Control Group	Experimental Group	Source of variance	Sum of squares	Df	Mean Square	'F' ratio
Pre-test	3.49	3.17	B	0.79	1	0.79	3.32
			W	9.19	28	0.34	
Post-test	4.20	3.18	B	5.39	1	5.39	12.42*
			W	12.15	28	0.43	

Table Value At 0.01=7.64

\*Significant At 0.01 Level

Table 1: The Summary Of Means And Analysis Of Variance Of The Pre-Test And Post Test Data On Forced Vital Capacity Of Control Group And Experimental Group

Group	Mean Scores		Analysis of Variance				
	Control Group	Experimental Group	Source of variance	Sum of squares	DF	Mean Square	'F' ratio
Pre-test	7.45	7.37	B	0.04	1	0.04	0.02
			W	44.56	28	1.59	
Post-test	7.99	7.57	B	1.33	1	1.33	0.40*
			W	93.64	28	3.34	

Table Value At 0.01=7.64

\*Insignificant At 0.01 Level

Table 2: The Summary Of Means And Analysis Of Variance Of The Pre-Test And Post Test Data On Peak Expiratory Flow Rate Of Control Group And Experimental Group

	Mean Scores		Analysis of Variance				
	Control Group	Experimental Group	Source of variance	Sum of squares	DF	Mean Square	'F' ratio
Pre-test	35.87	33.07	B	58.80	1	58.80	1.50
			W	1094.67	28	39.10	
Post-test	44.20	34.33	B	730.13	1	73.13	23.24*
			W	879.73	28	31.12	

Table Value At 0.01=7.64

\*Significant At 0.01 Level

Table 3: The Summary Of Means And Analysis Of Variance Of The Pre-Test And Post Test Data On 40 Mm Hg (Breath Holding Time) Of Control Group And Experimental Group

Table 1 indicates the 'F' test on forced vital capacity. The computed 'F' ratio was 12.42. Since the obtained 'F' ratio was higher than the required value of 7.64 at 0.01 level of confidence with 1/28 degree of freedom, there is a significant difference in forced vital capacity among the control and experimental group. Since the 'F' ratio is significant post hoc test of significance is carried out.

Table 2 indicates the 'F' test on Peak expiratory flow rate. The computed 'F' ratio was 0.40. Since the obtained 'F' ratio was lower than the required value of 7.64 at 0.01 level of confidence with 1/28 degree of freedom, it has been found that there is no significant difference among the control and experimental group in peak expiratory flow rate. Since the 'F' ratio is significant post hoc test of significance is not carried out.

Table 3 indicates the 'F' test on 40 mm Hg (Breath holding time). The computed 'F' ratio was 23.24. Since the obtained 'F' ratio was higher than the required value of 7.64 at 0.01 level of confidence with 1/28 degree of freedom, it has been found that there is significant difference among control and experimental group in 40 mm Hg (breath holding time). Since the 'F' ratio is significant post hoc test of significance is carried out.

## 9. Discussion

The results are given in Tables 1, 2 and 3. Table 1 displays the data of Forced vital capacity, Table 2 displays the data of Peak Expiratory flow rate and Table 3 displays the data of 40mm Hg (breath holding time). The difference between Pre-test means and Post test means and 'F' ratio is also indicated. The confidence interval at 0.01 level was found out.

The present study has established the fact that there is significant difference in Forced vital capacity and 40 mm Hg (Breath holding time) by yogic practice of Kriya, Bandha and Pranayama and no significant difference was found in Experimental group on Peak Expiratory flow rate. The training programme led the subjects to utilize the relaxation techniques benefiting the Cardio-respiratory system.

Gaig (1962) examined the influence of exercise over a large range of oxygen concentrations. All of the four healthy young adult male subjects were experienced in experiments of respiratory physiology. The PACO<sub>2</sub> at the breaking point was found to be higher during exercise than during rest in four subjects. The breaking point curve during exercise was elevated over the entire range of various oxygen concentrations indicating that whatever the changes produced they are related to the contribution of CO<sub>2</sub> to the urge to breath and re independent of O<sub>2</sub>.

Bhole(1976) introduced the study of breath holding time between male and female. It was found that there was an increase in the breath holding time in the study. The Kapalbhathi for 30 to 45 seconds was found to increase breath-holding time. The range of increase was from 10 to 22 seconds.

Joshi and Panare(1986) studied the effect of 6 weeks yogic training on pulmonary functions test in healthy medical students. Yogic training includes relaxation, Asanas, suddhikriyas and pranayama. Effect was compared with control group. There was no significant change in static long volumes like tidal volume and vital capacity, but three was significant increase in dynamic long volume like maxim8m breathing capacity and forced expiratory volume.

### 10. Conclusion

From the results of the statistical analysis, it was concluded that the experimental group shows significant changes in forced vital capacity and Breath holding time. And it was found that there was no significant difference in peak expiratory flow rate between the experimental group and control group.

### 11. Training Schedule

Duration: 10 weeks

Time : Six days per week 1 hour 6 a.m. to 7 a.m.

Week	I & II	III&IV	V&VI	VII&VIII	IX&X
Kriya (kabalapathi)	20 strokes x 3 set	40 strokes x 3 set	60 strokes x 3 set	80 strokes x 3 set	100strokes x 3 set
Bandha (Uddiyan)	3 times	4 times	5 times	6 times	7 times
Pranayama					
1. Anuloma-viloma	5 times	7 times	10 times	12 times	15 times
2. Ujjyai	5 times	7 times	10 times	12 times	15 times
3. Sitali	5 times	7 times	10 times	12 times	15 times
4. Bastrika	20 strokes x 3 set	20 strokes x 5 set	20 strokes x 7 set	20 strokes x 10 set	20 strokes x 12 set

Table : 4

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