



EFFECT OF KAPALBHATI IN DIFFERENT TIME DURATIONS ON VITAL CAPACITY, PEAK FLOW RATE AND ANXIETY AMONG SCHOOL GIRLS

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Abstract

The objective of the study was to investigate the effect of Kapalbhathi with different time duration on Vital Capacity, Peak Flow Rate and Anxiety among school girls. Another objective of the study was to improve Vital Capacity, Peak Flow Rate and Anxiety in school girls. **Method:-** To achieve the objective of this study 60 girls aged 15-18 years were randomly selected from Mount Carmel School, Muradnagar, Ghaziabad (UP). After that all the subjects were divided equally into four groups (three experimental groups and one control group). Subjects of three experimental groups were given Kapalabhati training program at different times for a period of 8 weeks and the control group was not given any kind of training. The selected variables to be compared were vital capacity, peak flow rate and Anxiety. To measure Vital Capacity among deferent groups, Dry-Spirometer was used, To measure Peak Flow Rate among deferent groups, Peak Flow Meter was used, To measure Anxiety among deferent groups, State- Trait Anxiety inventory was developed by Charles D., R.L. Gorsuch, R. Lushene, P. R. Vagg and G. A. Jacobs. **Statistical Techniques:-** ANCOVA was used to find out the effect of Kapalabhati with differernt time duration on Vital Capacity, Peak Flow Rate and Anxiety among school girls. The level of significance was set at 0.05 to test the hypothesis. **Results And Discussion:-** The results revealed that there were significant ($p > .05$) differences in the effect of Kapalabhati on vital capacity, peak flow rate and anxiety among school girls.

Keywords:- Kapalbhathi, Vital Capacity, Peak Flow Rate and Anxiety.

Introduction

Yoga is not an ancient myth buried in oblivion. It is the most valuable inheritance of the present. It is the essential need of today and the culture of tomorrow.

-Swami Satyananda Saraswati

The word Yoga means 'unity' or 'oneness' and is derived from the Sanskrit word *yuj*, which means 'to join'. This unity or joining is described in spiritual terms as the union of the individual consciousness with the universal consciousness. The definition of yoga in "Bhagavad Gita" which says, "*smatvameva yoga uchyate*" that is equanimity is called yoga. It means that yoga remains equipose in success and failure, gain or loss, victory and defeat etc. The term 'samatva' may also be translated as equilibrium, which leads to harmonious development of the physical, mental, spiritual aspects of the human personality. Equanimity and equilibrium are thus the essential trades of yoga. They help in skillful performance of action.

Yoga is a science practiced in India over the thousands of years. Yoga practices mainly consist of Asana (posture- a particular position of the body which contributes to steadiness of body and mind),

Pranayama (to control the breathing in a superior and extra-ordinary way to get maximum benefits.) and meditation. It produces consistent physiological changes and has sound and have sound scientific basis. In recent times, medical fraternity is much attracted towards beneficial effects of Yoga. We are well aware of the fact that any sort of exercise done regularly, is beneficial to the body. Yoga is considered to be a very good exercise for maintaining proper health and also has a profound effect on the lung functions of an individual. It is claimed that yogic practices help in prevention, control and rehabilitation of many respiratory diseases. In view of this, the present study was undertaken to see whether yoga has any effect on ventilator lung functions, which depend on compliance of lungs and thorax, airway resistance and strength of respiratory muscles.

Kapalabhati is an important part of Shatkarma the yogic system of body cleansing techniques. The word kapalabhati is made up of two words: kapal meaning 'skull' (here skull includes all the organs under the skull too) and bhati meaning 'shining, illuminating'. Due to the process, the organs under the skull mainly the brain and the small brain are influenced in a good manner. Kapalabhati pranayama helps to detoxify lungs and respiratory tracts, boosts the supply of oxygen and purifies blood and helps to tone up the abdominal muscles. It is also helpful in reducing abdominal fat, improvises concentration span. Pulmonary function tests (PFTs) provide important clinical information to identify and quantify the defects and abnormalities in the functioning of the respiratory system. Spirometry is the basic and useful method available for evaluating these pulmonary function parameters.

It is a simple expression of complex process, which measures airflow during inspiration and expiration and has a central role in early diagnosis and management of common respiratory diseases. In view of the above background the present study was conducted to study the effect of 6 weeks of Kapalabhati pranayama training on pulmonary function.

Shatkarma, the yogic system of bodily purification procedures, includes kapalabhati as a key component. The word kapalabhati is made up of the words kapal, which means "skull," including all of the organs located beneath the skull, and bhati, which means "shining, illuminating." The process has a positive impact on the under-the-skull organs, particularly the brain and the tiny brain. The kapalabhati pranayama improves blood purity, increases oxygenation, and tones the abdominal muscles in addition to aiding in the detoxification of the lungs and respiratory systems. Additionally, it helps with belly fat loss and improves attention span. PFTs, or pulmonary function tests, offer crucial clinical data that can be used to locate and measure flaws and irregularities in the way the respiratory system functions. The spirometer is the pulmonary function parameters can be evaluated using a simple and practical procedure.

It is a straightforward representation of a sophisticated procedure that monitors airflow during inspiration and expiration and plays a crucial part in the early detection and treatment of common respiratory illnesses. The purpose of the current study was to determine the impact of an 8-week Kapalabhati pranayama training program on pulmonary function in light of the aforementioned background.

METHODOLOGY

The subjects for the study were randomly selected from Mount Carmel School, Muradnagar, Ghaziabad (UP). The total number of subjects for the study was 60 girls. After that all the subjects were divided equally into four groups (three experimental groups and one control group). The age of the subjects were ranged between 15-18 years. Necessary data collected for vital capacity, peak flow rate and anxiety. To measure Vital Capacity among deferent groups, Dry-Spirometer was used. To measure Peak Flow Rate among deferent groups, Peak Flow Meter was used, To measure anxiety among deferent groups, *State- Trait Anxiety inventory was developed by Charles D., R.L. Gorsuch, R. Lushene, P. R. Vagg and G. A. Jacobs.* The results revealed that there were significant ($p > .05$) differences in the effect of Kapalabhati on all variables among school girls. For the testing of hypothesis, the level of significance was set at 0.05.

TRAINING PROTOCOL

The process of kapalabhati was taught and the practice session were conducted and supervised by the researcher himself. For teaching purpose, procedure were explained and demonstrated before and subjects performed the same after work. Necessary corrections were made. The rest of the instruction that were given in between succeeding programmed was as follows:-

TRAINING SCHEDULE OVERVIEW OF TRAINING SCHEDULE

	Group 1	Group 2	Group 3	Group 4
Total Time duration	30-40 minutes	30-40 minutes	30-40 minutes	Control Group
Time duration for 1 round	1 minutes	2 minutes	4 minutes	Control Group
Training Variation	Kapalbhati (1 round for 1 minute)	Kapalbhati (1 round for 2 minute)	Kapalbhati (1 round for 4 minute)	Control Group
Total Rounds	16	8	4	Control Group
Rounds*-Rest**	1 – 0.5 – 1	1 – 1 – 1	1 – 2 – 1	Control Group
Starting Prayer	1 minutes	1 minutes	1 minutes	Control Group
General Stretching	2 minutes	2 minutes	2 minutes	Control Group
Relaxation Posture & Closing Prayer	5 minutes	5 minutes	5 minutes	Control Group
Strokes of Kapalbhati per minute	80-90	80-90	80-90	Control Group

***Round in numbers **Rest in minutes**

Training Schedule of 1st Week

	Group 1	Group 2	Group 3	Group 4
Training Variation	Kapalbhati	Kapalbhati	Kapalbhati	Control Group
Training duration	15-25 minutes	15-25 minutes	15-25 minutes	Control Group
Kapalbhati rounds	8	4	2	Control Group
Rounds*-Rest**	1 – 0.5 – 1	1 – 1 – 1	1 – 2 – 1	Control Group
Starting Prayer	1 minutes	1 minutes	1 minutes	Control Group
General Stretching	2 minutes	2 minutes	2 minutes	Control Group
Relaxation Posture & Closing Prayer	5 minutes	5 minutes	5 minutes	Control Group

***Round in numbers **Rest in minutes**

Training Schedule of 2nd Week

	Group 1	Group 2	Group 3	Group 4
Training Variation	Kapalbhati	Kapalbhati	Kapalbhati	Control Group
Training duration	25-35 minutes	25-35 minutes	25-35 minutes	Control Group
Kapalbhati rounds	12	6	3	Control Group
Rounds*-Rest**	1 – 0.5 – 1	1 – 1 – 1	1 – 2 – 1	Control Group
Starting Prayer	1 minutes	1 minutes	1 minutes	Control Group
General Stretching	2 minutes	2 minutes	2 minutes	Control Group
Relaxation Posture & Closing Prayer	5 minutes	5 minutes	5 minutes	Control Group

***Round in numbers **Rest in minutes**

Training Schedule of 3rd Week to 8th Week

	Group 1	Group 2	Group 3	Group 4
Training Variation	Kapalbhati	Kapalbhati	Kapalbhati	Control Group
Training duration	35-45 minutes	35-45 minutes	35-45 minutes	Control Group
Kapalbhati rounds	16	8	4	Control Group
Rounds*-Rest**	1 – 0.5 – 1	1 – 1 – 1	1 – 2 – 1	Control Group
Starting Prayer	1 minutes	1 minutes	1 minutes	Control Group
General Stretching	2 minutes	2 minutes	2 minutes	Control Group
Relaxation Posture & Closing Prayer	5 minutes	5 minutes	5 minutes	Control Group

***Round in numbers **Rest in minutes**

RESULT OF THE STUDY

To find out effect of kapalbhati with different time durations on vital capacity among different groups of school girls, analysis of co-variance was used and presented in table-1.

TABLE-1**Analysis of co-variance table of among groups effects on vital capacity**

Source of Variance	Df	SS	MSS	F-ratio
Between Group	3	11.658	3.886	42.781*
Within Error	55	4.996	.091	

*Significant at .05 level

F-Value required to be significant at .05 (3, 55) = 2.78

Table no. 1 indicates the values test of difference among the subjects effects, which shows that there are a significant difference in pre and post test values of vital capacity for the four selected Groups, as the f-value has found to be 42.781. Further the mean difference among the group-1, group-2, group-3 and control group subjects in relation to their vital capacity level through post hoc test were computed which are presented in the table no. 2 and also are represented by figure I.

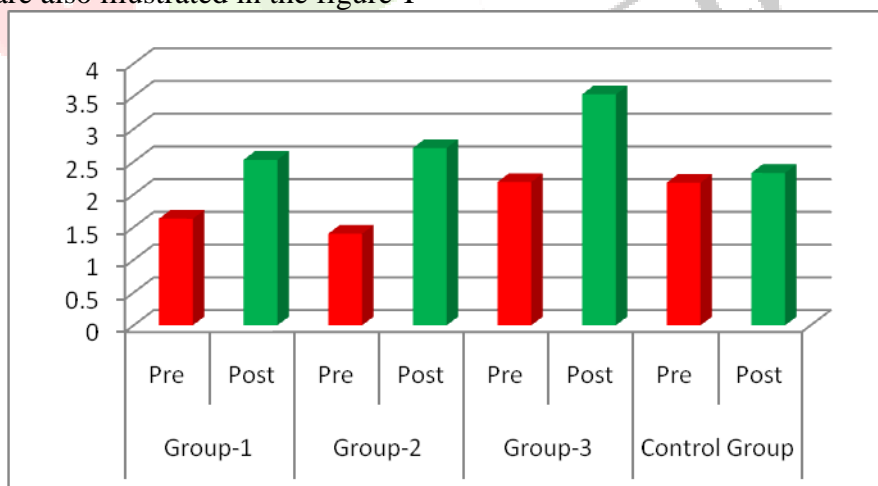
TABLE-2**Post hoc test for the differences between the adjusted post tests paired means on vital capacity**

Group-1	Group-2	Group-3	Control Group	M.D	C.D
2.677	2.997			-.32	.22
2.677		3.314		-.637	
2.677			2.112	.565	
	2.997	3.314		-.317	
	2.997		2.112	.885	
		3.314	2.112	1.202	

*Significant at .05 level

The post hoc test is to compare the vital capacity among group-1, group-2, group-3 and control group. It has clearly revealed the significant difference between the group-1 and group-2 where the calculated mean difference found (-.32), group-1 and group-3 where the calculated mean difference found (-.637), group-1 and control group where the calculated mean difference found (.565), group-2 and group-3 where the calculated mean difference found (-.317), group-2 and control group where the calculated mean difference found (.885) and group-3 and control group where the calculated mean difference found (1.202) was higher than the required value .22.

The scores are also illustrated in the figure-I

**Figure I: Graphical representation on vital capacity of school girls**

To find out effect of kapalbhati with different time durations on peak flow rate among different groups of school girls, analysis of co-variance was used and presented in table-3.

TABLE-3**Analysis of co-variance table of among groups effects on peak flow rate**

Source of Variance	df	SS	MSS	F-ratio
Between Group	3	9.129	3.043	77.505*
Within Error	55	2.159	.039	

*Significant at .05 level

F-Value required to be significant at .05 (3, 55) = 2.78

Table no. 3 indicates the values test of difference among the subjects effects, which shows that there are a significant difference in pre and post test values of peak flow rate for the four selected Groups, as the f-value has found to be 77.505. Further the mean difference among the group-1, group-2, group-3 and control group subjects in relation to their peak flow rate level through post hoc test were computed which are presented in the table no. 4 and also are represented by figure II.

TABLE-4

Post hoc test for the differences between the adjusted post tests paired means on peak flow rate

Group-1	Group-2	Group-3	Control Group	M.D	C.D
3.362	3.925			-.563	.072*
3.362		4.034		-.672	
3.362			2.979	.383	
	3.925	4.034		-.109	
	3.925		2.979	.946	
		4.034	2.979	1.055	

*Significant at .05 level

The post hoc test is to compare the peak flow rate among group-1, group-2, group-3 and control group. It has clearly revealed the significant difference between the group-1 and group-2 where the calculated mean difference found (-.563), group-1 and group-3 where the calculated mean difference found (-.672), group-1 and control group where the calculated mean difference found (.383), group-2 and group-3 where the calculated mean difference found (-.109), group-2 and control group where the calculated mean difference found (.946) and group-3 and control group where the calculated mean difference found (1.055) was higher than the required value .072.

The scores are also illustrated in the figure-II

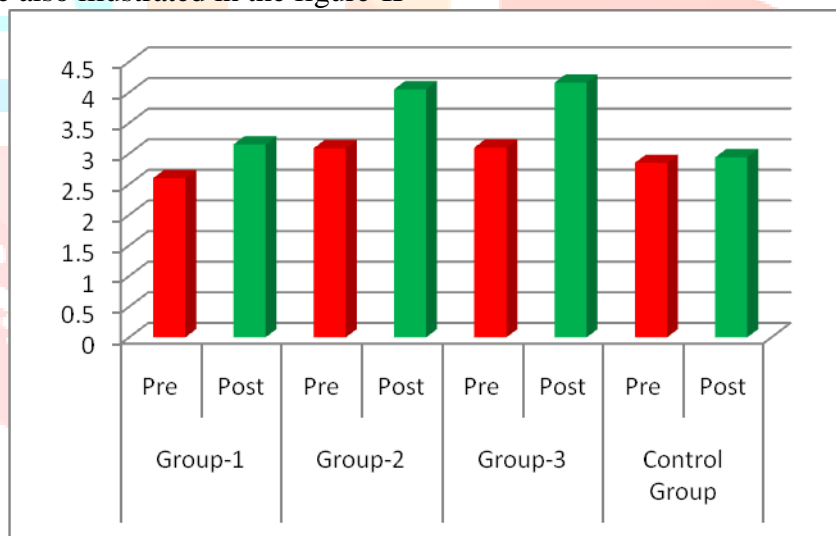


Figure II: Graphical representation on Peak Flow Rate of school girls

The effect of kapalbhathi with different time durations on anxiety Y-1 among different groups of school girls, analysis of co-variance was used and presented in table 5.

TABLE-5

Analysis of co-variance table of among groups effects on anxiety Y-1

Source of Variance	Df	SS	MSS	F-ratio
Between Group	3	101.209	33.736	27.576*
Within Error	55	67.285	1.223	

*Significant at .05 level

F-Value required to be significant at .05 (3, 55) = 2.78

Table no. 5 indicates the values test of difference among the subjects effects, which shows that there are a significant difference in pre and post test values of anxiety Y-1 for the four selected Groups, as the f-value has found to be 27.576. Further the mean difference among the group-1, group-2, group-3 and control group subjects in relation to their anxiety Y-1 level through post hoc test were computed which are presented in the table no. 6 and also are represented by figure III.

TABLE-6

Post hoc test for the differences between the adjusted post tests paired means on anxiety Y-1

Group-1	Group-2	Group-3	Control Group	M.D	C.D
38.876	39.105			-.229	.807*
38.876		42.001		-3.125	
38.876			42.818	-3.942	
	39.105	42.001		-2.896	
	39.105		42.818	-3.713	
		42.001	42.818	-.817	

*Significant at .05 level

The post hoc test is to compare the anxiety Y-1 among group-1, group-2, group-3 and control group. It has clearly revealed the significant difference between the group-1 and group-3 where the calculated mean difference found (-3.125), group-1 and control group where the calculated mean difference found (-3.942), group-2 and group-3 where the calculated mean difference found (-2.896), group-2 and control group where the calculated mean difference found (-3.713) and group-3 and control group where the calculated mean difference found (-.817) was higher than the required value .807.

The scores are also illustrated in the figure-III

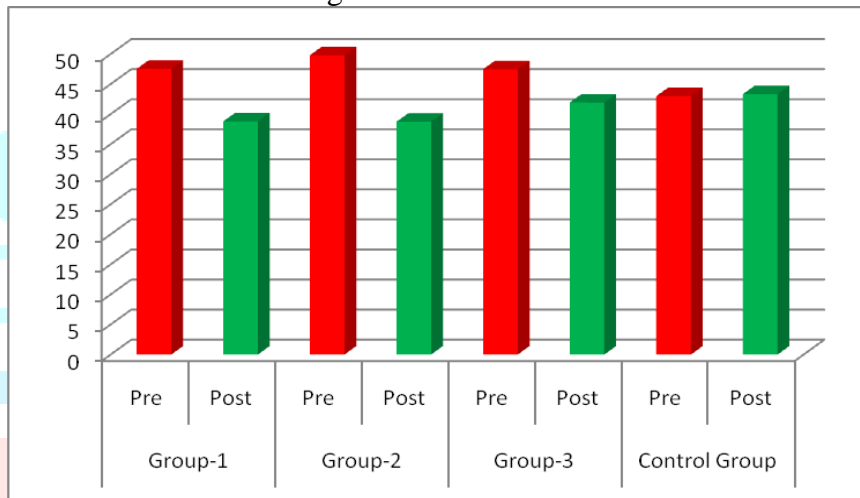


Figure III: Graphical Representation on Anxiety (Y-1) of school girls

The effect of kapalbhati with different time durations on anxiety Y-2 among different groups of school girls, analysis of co-variance was used and presented in table-7

TABLE-7

Analysis of co-variance table of among groups effects on anxiety Y-2

Source of Variance	Df	SS	MSS	F-ratio
Between Group	3	68.207	22.736	12.332*
Within Error	55	101.397	1.844	

*Significant at .05 level

F-Value required to be significant at .05 (3, 55) = 2.78

Table no. 7 indicates the values test of difference among the subjects effects, which shows that there are a significant difference in pre and post test values of anxiety Y-2 for the four selected Groups, as the f-value has found to be 12.332. Further the mean difference among the group-1, group-2, group-3 and control group subjects in relation to their anxiety Y-2 level through post hoc test were computed which are presented in the table no. 8 and also are represented by figure IV.

TABLE-8

Post hoc test for the differences between the adjusted post tests paired means on anxiety Y-2

Group-1	Group-2	Group-3	Control Group	M.D	C.D
41.180	38.867			2.313	.99*
41.180		40.757		.423	
41.180			42.862	-1.682	
	38.867	40.757		-1.89	
	38.867		42.862	-3.995	
		40.757	42.862	-2.105	

*Significant at .05 level

The post hoc test is to compare the anxiety Y-2 among group-1, group-2, group-3 and control group. It has clearly revealed the significant difference between the group-1 and group-2 where the calculated mean difference found (-2.313), group-1 and control group where the calculated mean difference found (-1.682), group-2 and group-3 where the calculated mean difference found (-1.89), group-2 and control group where the calculated mean difference found (-3.995) and group-3 and control group where the calculated mean difference found (-2.105) was higher than the required value .99.

The scores are also illustrated in the figure-IV

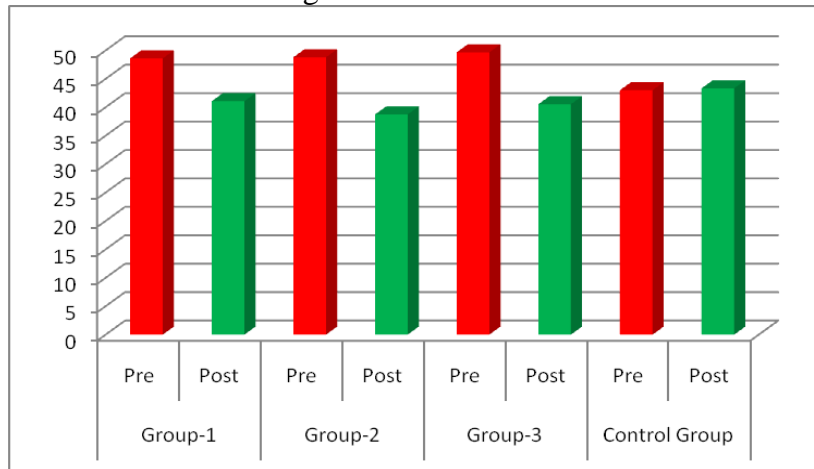


Figure IV: Graphical Representation on Anxiety (Y-2) of school girls

DISCUSSION OF THE RESULT

The present investigation was designed to know the effect of Kapalbhathi with different time durations on selected vital capacity, peak flow rate and anxiety among school girls. The purpose of this study was to find a better role of kapalbhathi effects on pulmonary functions in different time durations on selected variables. Although the research scholar did not interfere with the personal lifestyle of the subjects, some facts may be inaccessible. Which time Kapalbhathi will be more beneficial in looking at the lifestyle of school girls and making their lifestyle more effective, it has been seen in this study. In order to achieve the objectives, various variables of school girls were collected from various scientific aspects and after that the school girls were divided into four groups i.e. one control and three experimental groups for the study. After which these groups were trained deferent time in a day, after that data were obtained from all these groups again. Before going to the conclusion of the study, it must be understood that the progress of any country depends on its school girls. His positive contribution definitely helps any society or country to move in the right direction.

The result of the study revealed significant difference among the mean scores of Kapalbhathi effect on pre and post physiological variables (vital capacity, Peak expiratory flow and anxiety) of school girls in the experimental group. The mean score of Kapalbhathi training girls group were found higher than the control group school girls, We cannot deny the fact that Kapalbhathi training has more effect on variables (vital capacity, Peak expiratory flow and anxiety) on school girls. The results of this study also point to the same. The result of present study is also on the line of the studies conducted by **Nagesh.J, reena .P (2017)** The study undertaken was entitled as “The Effect of Pranayama and Kapalbhathi on Selected Psychological and Physiological variables of school going children in Jaipur”. The results of the study were to (i) Find out the effect of Kapalbhathi on selected physiological variables of school going children of Jaipur. (ii) Find out the effect of Kapalbhathi on selected psychological variables of school going children of Jaipur. (iii) Find out the effect of Pranayama on selected physiological variables of school going children of Jaipur. (iv) Find out the effect of Pranayama on selected psychological variables of school going children of Jaipur. **Kanhaiya I. (2018)** conducts a study on topic “Effect of kapalbhathi on mental health and respiratory parameters”. Kapalabhati is the rhythmic breathing done by the belly with the speed of approximate 90 breathings per minute. Beginners (especially with not trained diaphragm breathing) should do about 60 breathings per minute, and then increase this rhythm. The main mistake in doing Kapalabhati is to use pectoral muscles, which can lead to break-ups of heartbeat and cause pain in the diaphragm. Physically Kapalabhati is an intracranial hydraulic massage of the brain, done by pressure difference made by the belly. A Kapalabhati works the same way as Pranayama, but because of reducing the permeability of the air in inhaling, the hydraulic wave is twice stronger, that s why the effect is greater. Another mechanism of action has to with the altering stimulation of Ida and Pingala, widening the spectrum of ANS states. **Nimai C. (2019)** conduct a study on topic “Effect of Kapalbhathi and selected Pranayama techniques on physiological parameters of

middle aged sedentary women”. To compare between the mean scores of pre and post-test of the both groups Independent Sample t-test was applied. From the findings of the study it may be concluded that resting respiratory rate, vital capacity, peak expiratory flow rate and systolic blood pressure were significantly improved as compared to that of control group. Insignificant between the group differences were noted in resting heart rate, diastolic blood pressure and body fat percent. From the findings of this study we concluded that Pranayama techniques may be recommended to improve the selected physiological characteristics of middle age sedentary women for their economic and productive life style. **Kamakhya K. (2016)** conduct a study on topic “Significance of Nadi Sodhan and Kapalbhathi on forced ventilation capacity (FVC), maximum voluntary ventilation (MVV) and peak expiratory flow rate (PEFR)”. Results show that FVC $t=5.4$, $p<0.05$, for MVV $t=6.4$, $p<0.05$ and for PEFR $t=8.4$, $p<0.05$. The study adds: Yogic interventions proving itself as an effective tool as CAM to improve the respiratory functions.

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