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Effect of mudra and Bandh on selected physiological variables

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Abstract
The purpose of the study was to find out the effect of Vipareet Karni Mudra, Uddiyan Bandh and Combination of both on selected physiological variables. Forty female students of L.N.I.P.E., Gwalior were randomly selected in four Groups. The age of the subjects was between 18-25years. The physiological variables selected for this study were blood pressure (systolic and diastolic blood pressure), vital capacity, pulse rate, respiratory rate and breath holding capacity. The criterion measures adopted in this study were for physiological variables resting pulse rate and blood pressure (systolic and diastolic) was measured by use of automatic Sphygmomanometer. Respiratory rate was felt by placing fingers below the nostrils. The test-retest method was used to establish reliability. The subjects were randomly divided into four Groups i.e. Vipareet Karni Group, Uddiyan Bandh Group, Combination Group and Control Group. The training was given for 6 weeks to the three Groups. Pre data was collected on the selected physiological variables. After the completion of the training, the post data was collected on the similar conditions. The statistical technique (ANCOVA) was used to analyze the significant differences and the level of significance was set at 0.05 level for testing the hypothesis. The result revealed that significance difference was found in Vital Capacity, Breath Holding Capacity (positive and negative) whereas there was no significant difference among the three groups in Blood Pressure, Respiratory rate and Pulse rate.

Keywords: Vipareet Karni, Uddiyan Bandh, systolic and diastolic blood pressure etc

Introduction
Mudra and Bandha have been an integral part of yoga practice for thousands of years and were detailed in the very first texts written on hatha yoga. Despite the evolution that we have seen in hatha yoga over the centuries, they are still very relevant in modern yoga practice and are taught widely in a variety of classes across the world today. In the Hatha Yoga Pradipika, Mudras and Bandhas are talked about as being interchangeable. For example, in Verses 6 & 7, Chapter 2, the Hath Yoga Pradipika states: "Maha Mudra, Maha Bandha, Maha Bedha, Khechari, Uddiyana, Moola Bandha and Jalandhara Bandha. Vipareeta Karani Mudra, Vajroli and Shakti Chalana, Verily, these are ten mudras which destroy old age and death."

'Mudra' is a term meaning a 'bodily position' or 'gesture'. However, there is much more to mudra than this. Muktibodhananda's HYP (page 286): 'Mudra is a specific body position which channelizes the energy produced by asana and pranayama into the various centres, and arouses particular states of mind." Some mudras are done separately after asana and pranayama and others are performed with asana and pranayama to help the awaken the chakras and arouse kundalini shakti. Mudra are a combination of subtle physical movements which alter mood, attitude and perception and which deepens awareness and concentration [1],

With the navel region above and the palate below, the sun is above and the moon below. This is Vipareeta karani mudra, which is the secret by all standards. Place the head on the ground, provide support with both hands and raise both legs; this is Vipareeta karani mudra. When given by the guru's instruction it is fruitful. It is concerned with reversing the flow of fluid from the brain centre.

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[1] Swami Muktibodhananda, Hath Yoga Pradipika (Munger, Bihar: Yoga Publication Trust; 2014).

The process is reversed by reversing the natural upright body position. The force of gravity naturally pulls all body fluid down to the body part. By inverting the body so that the head is down and the feet are up, all the fluid flow back towards the head without undue force and pressure [2].

Bandha is a Sanskrit word meaning physical and psychic 'lock' or 'bind' which disrupt the sensations being created in the nerves inside the body and brain, and awaken specific kinds of sensations. Any process of contraction or expansion in the internal organ, whether in the neck, throat, perineum, or anal region, changes the reaction, emotions and the quantum of energy in the internal organs. It brings the body to a stimulated or a peaceful state, resulting in the experience of a feeling of inner stability. There are three main Bandhas: the Moola Bandha, the Uddiyana Bandha and the Jalandhara Bandha. The Maha Bandha is a combination of all three Bandhas with all three being engaged simultaneously.

The Hath Yoga Pradipika describes the Uddiyana Bandha as 'the rising or flying Bandha, because through its practise, the great bird (shakti) flies upward with ease." (Verses 55 and 56, Chapter 3). It goes on to describe how to perform the Bandha in simple terms as an action of pulling in the abdomen. However, in modern texts the practise is described in more detail. For example, Coulter describes the practise as being a two stage process involving pulling in the abdomen on an exhale and then creating a vacuum in the chest by doing a false inhalation. The Uddiyana Bandha also contracts the upper abdominals located approximately two inches below the Manipura, or Solar Plexus Chakra. In physiological terms, the Uddiyana Bandha is the only Bandha which stretches the diaphragm and therefore provides it with a good exercise and consequently helps with breathing. It also sets the foundation for asana practise and works on the inner core [3].

The visible effects of Mudra and Bandha are well known and hence the researcher became inclined to venture into the study to find out its effect on the selected physiological variables.

Methodology
Selection of Subjects
Forty (40) female students with age range from 18-25 years were randomly selected as subjects from Lakshmibai National Institute of Physical Education. All subjects were, then, randomly assigned into three Groups (A, B, C) and one control Group each consisting of 10 students. The experimental treatment was also assigned to the Group at random. The Group A, B and C was treated as experimental Groups and were given training program of Mudra, Bandha and combination of both respectively. The Group D served as a control Group and continued participating in the normal program of the college.

Selection of variables
Keeping the feasibility criterion in mind, especially in the case of availability of instruments and equipment, the following variables were chosen:
1) Breath holding time
2) Vital capacity
3) Resting respiratory rate
4) Blood pressure
5) Resting pulse rate

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2 Swami Niranjanananda Saraswati, Gheranda Samhita (Munger, Bihar; Yoga Publication Trust), p.324.
3 Swami Rama, What is Yoga (New Delhi: S.Newman and Company, 1976), p.9.

Experimental design
Pre-test Post-test Randomized Group design was adopted for the study as all subjects were randomly selected and randomly divided into four Groups. Further the experimental treatments were randomly assigned to three Groups and the other Group served as the control Group. The experimental Group participated in the training program i.e. Group A, B and C. The training program was conducted for a total duration of six weeks.

Collection of data
The data was collected for each variable administrating their respective tests. The tests were administered at Exercise Physiology lab of Lakshmibai National Institute of Physical Education, Gwalior. To ensure that the data was reliable each subject was given sufficient number of trails to perform the respective test for each variable. The data were collected before the starting of experimental treatment (pre-test) and the end of training period (post-test). The test used was explained to the subjects prior to their administration.

Administration of the test
The study was conducted for a period of six weeks in the month of February and March. The climatic condition was moderate with temperature ranging from 28°C to 30°C. Forty subjects were assembled in the recreation hall of Girls Hostel, LNIPE, Gwalior at 6:15 A.M. Four Groups comprising of 10 subjects each were formed i.e. Group A, B and C (experimental Groups) and Group D (Control Group). All subjects were voluntarily ready to learn Uddiyan Bandha and Vipareet Karni mudra. The scholar briefed the subjects of the study and also explained both Mudra and Bandha in details with practical demonstration.

Training Protocol
The Mudra and Bandh was taught and the practice session were conducted and supervised by the researcher himself. For teaching purpose, each mudra and bandh 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:-

First and Second week

S. No.	Training	Duration (sec)	Repetition	Total (sec)
1.	Omkar Chanting	60	-	60
2.	Prayer	60	-	60
3.	Warming up	120	-	120
4.	Vipareet Karni mudra/ Uddiyan Bandh /Combination	30	10	300
5.	Omkar Chanting	30	-	30
6.	Prayer	30	-	30

Note: Each subject was allowed to relax in Shavasana for 30 sec after performing every repetition. (Total 5 min). Total training program schedule: 15 min

Third and Fourth week

S. No.	Training	Duration (sec)	Repetition	Total (sec)
1.	Omkar Chanting	60	-	60
2.	Prayer	60	-	60
3.	Warming up	120	-	120
4.	Vipareet Karni Mudra/ Uddiyan Bandh/ Combination	60	10	600
5.	Omkar Chanting	30	-	30
6.	Prayer	30	-	30

Note: Each subject was allowed to relax in Shavasana for 60 sec after performing every repetition. (Total 10 min).Total training program schedule: 25 min

Fifth and Sixth week

S. No.	Training	Duration(sec)	Repetition	Total(sec)
1.	Omkar Chanting	60	-	60
2.	Prayer	60	-	60
3.	Warming up	120	-	120
4.	Vipareet Karni Mudra/ Uddiyan Bandh/ Combination	60-90	7	420-630
5.	Omkar Chanting	30	-	30
6.	Prayer	30	-	30

Note: Each subject was allowed to relax in Shavasana for 60 sec after performing every repetition. (Total 10 min). Total training program schedule: 22 to 25min

Results

To find the effect of six weeks of training among the Group i.e. Vipareet Karni Group, Uddiyan Bandh Group, combination Group and Control Group, the data was examined by applying ANCOVA. The level of significance was set at 0.05.

Table 1(a): Mean Value and Adjusted Mean Score of the Groups for Systolic Blood Pressure.

Groups	Pre mean	Post mean	Adjusted mean
Vipareet Karni	112.3 $\pm$ 12.36	112.5 $\pm$ 4.81	112.03
Uddiyan Bandh	109.1 $\pm$ 9.47	109.1 $\pm$ 9.47	116.45
Combination	109.5 $\pm$ 13.31	109.8 $\pm$ 7.14	110.22
Control Group	112.4 $\pm$ 6.41	115.5 $\pm$ 8.40	114.10

Table 1(a) reveals the mean & adjusted mean scores after eliminating the effect of covariate of Vipareet Karni, Uddiyan Bandh, Combination and Control Group. Similarly in Vipareet Karni Group the pre mean & post mean along with standard deviation is 112.3 $\pm$ 12.36 & 112.5 $\pm$ 4.81. In Uddiyan Bandh Group pre mean & post mean along with standard deviation is 109.1 $\pm$ 9.47 & 109.1 $\pm$ 9.47, In Combination Group pre mean & post mean along with standard deviation is 109.5 $\pm$ 13.31 & 109.8 $\pm$ 7.14, Control Group pre mean & post mean along with standard deviation is 112.4 $\pm$ 6.41 & 115.5 $\pm$ 8.40. The adjusted mean score of Vipareet Karni Group, Uddiyan Bandh Combination Group, and Control Group are 112.03, 116.45, 110.22 & 114.10 respectively.

Table 1(b): Analysis of Co-Variance

Source	Sum of Squares	DF	Mean Square	F	Sig.
Treament_Group	238.28	3	79.43	1.15	.345
Error	2427.86	35	69.37		

Significant at .05 level, F.05 (3, 35) = 2.87

Table 1(b) shows that the p-value for the F-statistic is 0.345 which is greater than 0.05, so it is insignificant. Thus, the null hypothesis of no difference among the adjusted post-means for the data on systolic blood pressure in four treatment Groups may be accepted at 5% level.

Table 2(a): Mean Value and Adjusted Mean Score of the Groups for Diastolic Blood Pressure.

Groups	Pre mean	Post mean	Adjusted mean
Vipareet Karni	112.3 $\pm$ 11.82	112.5 $\pm$ 3.95	68.16
Uddiyan Bandh	72.0 $\pm$ 5.58	70.9 $\pm$ 8.39	70.37
Combination	70.4 $\pm$ 7.26	66.2 $\pm$ 7.2	66.24
Control Group	70.4 $\pm$ 3.95	115.5 $\pm$ 3.06	70.03

Table No. 2(a) reveals the mean & adjusted mean scores after eliminating the effect of covariate of Vipareet Karni, Uddiyan Bandh, Combination and Control Group. In Vipareet Karni Group the pre mean & post mean along with standard deviation is 112.3 $\pm$ 11.82 & 112.5 $\pm$ 3.95. Similarly in Uddiyan Bandh Group pre mean & post mean along with standard deviation is 72.0 $\pm$ 5.58 & 70.9 $\pm$ 8.39, In Combination Group pre mean & post mean along with standard deviation is 70.4 $\pm$ 7.26 & 66.2 $\pm$ 7.2, In Control Group pre mean & post mean along with standard deviation is 70.4 $\pm$ 3.95 & 115.5 $\pm$ 3.06. The adjusted mean score of Vipareet Karni Group, Uddiyan Group, Combination Group and Control Group are 68.16, 70.37, 66.24 & 70.03 respectively.

Table 2(b): Analysis of Co-Variance.

Source	Sum of Squares	DF	Mean Square	F	Sig.
Treament_Group	109.06	3	36.35	1.09	.365
Error	1163.91	35	33.26		

Significant at .05 level, F.05 (3, 35) = 2.87

Table 2(b) shows that the p-value for the F- statistic is 0.365 which is greater than 0.05, so it is insignificant. Thus, the null hypothesis of no difference among the adjusted post-means for the data on diastolic blood pressure in four treatment Groups may be accepted at 5% level.

Table 3(a): Mean Value and Adjusted Mean Score of the Groups for Vital Capacity.

Groups	Pre mean	Post mean	Adjusted mean
Vipareet Karni	2.23 $\pm$ 0.61	2.83 $\pm$ 0.52	2.88
Uddiyan Bandh	2.35 $\pm$ 0.49	3.04 $\pm$ 0.46	3.04
Combination	1.98 $\pm$ 0.57	3.45 $\pm$ 0.37	3.60
Control Group	2.81 $\pm$ 0.45	2.76 $\pm$ 0.39	2.56

Table No 3(a) reveals that the mean & adjusted mean scores after eliminating the effect of covariate of Vipareet Karni, Uddiyan Bandh, Combination and Control Group. In Vipareet Karni Group the pre mean & post mean along with standard deviation is 2.23 $\pm$ 0.61 & 2.83 $\pm$ 0.52. Similarly in Uddiyan Bandh Group pre mean & post mean along with standard deviation is 2.35 $\pm$ 0.49 & 3.04 $\pm$ 0.46, In Combination Group pre mean & post mean along with standard deviation is 1.98 $\pm$ 0.57 & 3.45 $\pm$ 0.37, In Control Group pre mean & post mean along with standard deviation is 2.81 $\pm$ 0.45 & 2.76 $\pm$ 0.39. The adjusted mean score of Vipareet Karni Group, Uddiyan Bandh, Combination Group and Control Group are 2.88, 3.04, 3.60 & 2.56 respectively.

Table 3(b): Analysis of Co-Variance.

Source	Sum of Squares	DF	Mean Square	F	p-value
Treament_Group	4.48	3	1.494	10.29	.00
Error	5.08	35	.145		

Significant at .05 level, F.05 (3, 35) = 2.87

Table 3(b) shows that the p-value for the F- statistic is 0.00 which is less than 0.05, so it is significant. Thus, the null hypothesis of no difference among the adjusted post-means for the data on diastolic blood pressure in four treatment Groups may be rejected at 5% level.

Table 3(c): Pairwise Comparisons of Vital Capacity

(I) Treatment Group	(J) Treatment Group	Mean Difference (I-J)	Std. Error	Sig.
Vipareet Karni	Uddiyan Bandh	-.16	.17	.357
	Combination	-.76*	.17	.000
	Control Group	.31	.18	.097
Uddiyan Bandh	Vipareet Karni	.16	.17	.357
	Combination	-.57*	.18	.003
	Control Group	.47*	.18	.012
Combination	Vipareet Karni	.73*	.17	.000
	Uddiyan Bandh	.57*	.18	.003
	Control Group	1.04*	.19	.000
Control Group	Vipareet Karni	-.31	.18	.097
	Uddiyan Bandh	-.47*	.18	.012
	Combination	-1.04*	.20	.000

Based on estimated marginal means
* The mean difference is significant at the .05 level.

- Since F- statistic is significant, post hoc comparison has been made which is shown in table 3(c). It may be noted that p-value for the mean difference between Vipareet Karni and combination is 0.000, Uddiyan Bandha and combination is 0.003, Uddiyan Bandha and Combination is 0.000 and Combination and Control Group is 0.000. All these p- values are less than 0.005 and hence they are significant at 5% level.
- P- Value for the mean difference between Vipareet Karni and Uddiyan Bandh is 0.357 and Combination and Vipareet Karni is 0.097. Both these p-values are more than 0.05 and hence they are insignificant at 5% level.

Table 4(a): Mean value and adjusted mean score of the groups for positive breath holding capacity.

Groups	Pre mean	Post mean	Adjusted mean
Vipareet Karni	52.5 ± 17.32	63.3 ± 19.28	51.39
Uddiyan Bandh	36.3 ± 14.33	43.6 ± 11.84	49.07
Combination	33.8 ± 9.86	63.7 ± 22.79	74.56
Control Group	43.0 ± 26.93	51.2 ± 29.84	53.48

Table No 4(a) reveals that the mean & adjusted mean scores after eliminating the effect of covariate of Vipareet Karni, Uddiyan Bandh, Combination and Control Group. In Vipareet Karni Group the pre mean & post mean along with standard deviation is 52.5 ± 17.32 & 63.3 ± 19.28. Similarly Uddiyan Bandh Group pre mean & post mean along with standard deviation is 36.3 ± 14.33 & 43.6 ± 11.84, Combination Group pre mean & post mean along with standard deviation is 33.8 ± 9.86 & 63.7 ± 22.79, Control Group pre mean & post mean along with standard deviation is 43 ± 26.93 & 51.2 ± 29.84. The adjusted mean score of Vipareet Karni Group, Uddiyan Group, Combination Group and Control Group 51.39, 49.07, 74.56 & 53.48 respectively.

Table 4(b): Analysis of Co-Variance

Source	Sum of Squares	DF	Mean Square	F	Sig.
Treament Group	3964.609	3	1321.536	5.690	.003
Error	8129.452	35	232.270		

Significant at .05 level, F.05 (3, 35) = 2.87

Table 4(b) shows that the p-value for the F-statistic is 0.003 which is less than 0.05, so it is significant. Thus, the null hypothesis of no difference among the adjusted post-means for the data on positive breath holding capacity in four treatment Groups may be rejected at 5% level.

Table 4(c): Pairwise Comparisons of Positive Breath Holding Capacity

(I) Treatment Group	(J) Treatment Group	Mean Difference (I-J)	Std. Error	Sig.
Vipareet Karni	Uddiyan Bandh	2.31	7.18	.749
	Combination	-23.17*	7.30	.003
	Control Group	-2.10	6.94	.764
Uddiyan Bandh	Vipareet Karni	-2.31	7.18	.749
	Combination	-25.48*	6.83	.001
	Control Group	-4.41	6.88	.526
Combination	Vipareet Karni	23.17*	7.30	.003
	Uddiyan Bandh	25.48*	6.83	.001
	Control Group	21.08*	6.94	.004
Control Group	Vipareet Karni	2.10	6.94	.764
	Uddiyan Bandh	4.41	6.88	.526
	Combination	-21.07*	6.94	.004

- Since F- statistic is significant, post hoc comparison has been made which is shown in table 4(c). It may be noted that p-value for the mean difference between Vipareet Karni and combination is 0.003, Uddiyan and combination is 0.001, Uddiyan Bandh and Vipareet Karni was 0.003, combination and control Group is 0.004. All these p- values are less than 0.005 and hence they are significant at 5% level.
- P- Value for the mean difference between Vipareet Karni and Uddiyan Bandh is 0.749, Vipareet Karni and control

Group was .764, and Uddiyan Bandh and control Group 0.526. These p- values are more than 0.05 and hence they are insignificant at 5% level.

Table 5(a): Mean value and adjusted mean score of the groups for negative breath holding capacity

Groups	Pre mean	Post mean	Adjusted mean
Vipareet Karni	35.6 $\pm$ 9.35	38.7 $\pm$ 10.52	37.22
Uddiyan Bandh	30.1 $\pm$ 6.21	63.5 $\pm$ 13.25	67.10
Combination	27.4 $\pm$ 7.90	42.2 $\pm$ 7.86	48.43
Control Group	39.4 $\pm$ 15.06	39.6 $\pm$ 15.74	34.15

Table No 5(a) reveals the mean & adjusted mean scores after eliminating the effect of covariate of Vipareet Karni, Uddiyan Bandh, Combination and Control Group. In Vipareet Karni Group the pre mean & post mean along with standard deviation is 35.6 $\pm$ 9.35 &38.7 $\pm$ 10.52. Similarly Uddiyan Bandh Group pre mean & post mean along with standard deviation is 30.1 $\pm$ 6.21 &63.5 $\pm$ 13.25, Combination Group pre mean & post mean along with standard deviation is 27.4 $\pm$ 7.90& 42.2 $\pm$ 7.86, Control Group pre mean & post mean along with standard deviation is 39.4 $\pm$ 15.06 & 39.6 $\pm$15.74. The adjusted mean score of Vipareet Group, Uddiyan Group, Combination Group and Control Group are 37.22, 67.10, 48.43 and 34.15.

Table 5(b): Analysis of Co-Variance

Source	Sum of Squares	DF	Mean Square	F	Sig.
Treament_Group	5838.82	3	1946.27	37.49	.00
Error	1817.17	35	51.92		

Significant at .05 level, F.05 (3, 35) = 2.87

- Table 5(b) shows that the p-value for the F- statistic is 0.00 which is less than 0.05, so it is significant. Thus, the null hypothesis of no difference among the adjusted post-means for the data on negative breath holding capacity in four treatment Groups may be rejected at 5% level.

Table 5(c): Pairwise comparisons of negative breath holding capacity.

(I) Treatment Group	(J) Treatment Group	Mean Difference (I-J)	Std. Error	Sig.
Vipareet Karni	Uddiyan Bandh	-29.89*	3.36	.00
	Combination	-11.22*	3.47	.00
	Control Group	3.07	3.23	.35
Uddiyan Bandh	Vipareet Karni	29.89*	3.36	.00
	Combination	18.67*	3.24	.00
	Control Group	32.96*	3.40	.00
Combination	Vipareet Karni	11.22*	3.47	.00
	Uddiyan Bandh	-18.67*	3.24	.00
	Control Group	14.29*	3.52	.00
Control Group	Vipareet Karni	-3.07	3.23	.35
	Uddiyan Bandh	-32.96*	3.40	.00
	Combination	-14.28*	3.52	.00
Based on estimated marginal means				
*. The mean difference is significant at the .05 level.				

- Since F- statistic is significant, post hoc comparison has been made which is shown in table 3(c). It may be noted that p-value for the mean difference between Vipareet Karni and Uddiyan Bandh was 0.000, Vipreet Karni and combination is 0.003, Uddiyan Bandh and combination is 0.000, Uddiyan Bandh and control Group was 0.000 and combination and control Group was 0.000. All these p-values are less than 0.005 and hence they are significant at 5% level.
- P- Value for the mean difference between Vipreet Karni and control Group was 0.347 which is more than 0.05 and hence it was insignificant at 5% level.

Table 6(a): Mean value and adjusted mean score of the groups for respiratory rate.

Groups	Pre mean	Post mean	Adjusted mean
Vipareet Karni	20.2 $\pm$ 3.94	15.0 $\pm$ 4.92	14.97
Uddiyan Bandh	20.8 $\pm$ 4.02	17.6 $\pm$ 4.60	17.38
Combination	21.4 $\pm$ 4.12	17.1 $\pm$ 2.23	16.70
Control Group	18.0 $\pm$ 3.13	18.2 $\pm$ 3.33	18.86

Table No. 6(a) reveals that the mean & adjusted mean scores after eliminating the effect of covariate of Vipareet Karni, Uddiyan Bandh, Combination and Control Group. In Vipareet Karni Group the pre mean & post mean along with standard deviation is 20.2 $\pm$ 3.94&15.0 $\pm$ 4.92. Similarly Uddiyan Bandh Group pre mean & post mean along with standard deviation is 20.8 $\pm$ 4.02&17.6 $\pm$ 4.60, Combination Group pre mean & post mean along with standard deviation is 21.4 $\pm$ 4.12 & 17.1 $\pm$ 2.23, Control Group pre mean & post mean along with standard deviation is 18.0 $\pm$3.13& 18.2 $\pm$3.33. The adjusted mean score of Vipareet Group, Uddiyan Group, Combination Group and Control Group are 14.97, 17.38, 16.70 & 18.86 respectively.

Table 6(b): Analysis of Co-Variance.

Source	Sum of Squares	DF	Mean Square	F	Sig.
Treament_Group	75.28	3	25.09	1.75	.174
Error	500.60	35	14.30		

Significant at .05 level, F.05 (3, 35) = 2.87

- Table 6(b) shows that the p-value for the F- statistic is 0.174 which is more than 0.05, so it is insignificant. Thus, the null hypothesis of no difference among the adjusted post-means for the data on respiratory rate in four treatment Groups may be accepted at 5% level.

Table 7(a): Mean value and adjusted mean score of the groups for pulse rate.

Groups	Pre mean	Post mean	Adjusted mean
Vipareet Karni	67.8 $\pm$ 3.94	67.0 $\pm$ 2.31	66.93
Uddiyan Bandh	67.1 $\pm$ 4.56	66.9 $\pm$ 3.90	67.11
Combination	67.1 $\pm$ 6.33	67.9 $\pm$ 4.72	68.11
Control Group	68.5 $\pm$ 3.14	68.2 $\pm$ 3.22	67.85

Table No 7(a) reveals that the mean & adjusted mean scores after eliminating the effect of covariate of Vipareet Karni, Uddiyan Bandh, Combination and Control Group. In Vipareet Karni Group the pre mean & post mean along with standard deviation is 67.8 ± 3.94 & 67.0 ± 2.31. Similarly in Uddiyan Bandh Group pre mean & post mean along with standard deviation is 67.1 ± 4.56 & 66.9 ± 3.90, In Combination Group pre mean & post mean along with standard deviation is 67.1 ± 6.33 & 67.9 ± 4.72, In Control Group pre mean & post mean along with standard deviation is 68.5 ± 3.14 & 68.2 ± 3.22. The adjusted mean score of Vipareet Group, Uddiyan Group, Combination Group and Control Group are 66.93, 67.11, 68.11 & 67.85 respectively.

Table 7(b): Analysis of Co-Variance.

Source	Sum of Squares	DF	Mean Square	F	Sig.
Treament_Group	9.71	3	3.24	.32	.81
Error	354.58	35	10.13		

Significant at .05 level, $F_{.05}$ (3, 35) = 2.87

Table 7(b) shows that the p-value for the F-statistic is 0.811 which is more than 0.05, so it is insignificant. Thus, the null hypothesis of no difference among the adjusted post-means for the data on pulse rate in four treatment Groups may be accepted at 5% level.

Discussion of finding
The purpose of the study was to find out the effect of the Mudra and Bandh on the selected physiological variables. The result of the study reveals that the significance difference was found in the Vital Capacity (p-value = 0.00). Similar research by Manju Pushpa (2015) [5] found that practicing selected Bandh and Pranayam depicted significant changes in vital capacity. Positive Breath Holding Capacity (p-value = 0.003) and Negative Breath Holding Capacity (p-value = 0.00) increased significantly as a result of Mudra and Bandh practices. The results are in line with the studies of K. Lakshmi, P. Manju Pushpa (2015) [5] who found that after the yoga practices, and training Groups showed significant improvement in the breath holding time. This result is also supported by Gore M.M who mentioned that Uddiyan Bandh creates negative pressure in the thorax.
These results may be attributed to the fact that practicing Vipareet Karni Mudra and Uddiyan Bandh may lead to the stretching and strengthening of the diaphragmatic and abdominal muscles and in the increased size of the lung cavity which is directly proportional to the pulmonary functions. The upward movement of the diaphragm in Uddiyan Bandh tightly squeezes the lungs which help to open out the alveoli in the lungs and improve lungs efficiency. Vipareet Karni mudra has a powerful draining influence on the visceral organs; inversion also profoundly influences the entire vascular network. Thus training results in increased vital capacity, positive and negative breath holding capacity.
The results of the study further reveals that resting respiratory rate (p-value = 0.174) showed insignificant difference after the training. The result is in consonance with who also showed that the effect of Uddiyan Bandh has no significant difference in respiratory rate after the training.
The findings of the study also shows an insignificant difference in pulse rate (p-value = 0.811), and as in his study by The results of the study also showed insignificant difference in the systolic blood pressure (p-value = 0.345), diastolic blood pressure (p-value = .365) and these results

may be attributed to the insufficient hours dedicated to the training and to the lesser numbers of subjects involved in the study which caused insignificant difference.

Conclusion
Within the limitations of this study probably influencing the results included daily routine & food habits and subject's psychological state prior to study. It thus can be concluded that there was

- No significant differences found on selected physiological variables namely blood pressure (systolic and diastolic both), respiratory rate and pulse rate after the 6 weeks of training to the females subject of age ranging 18-25 years.

- Significant difference was found in vital capacity, breath holding capacity (positive and negative) after the 6 weeks of training to the female's subject of age ranging 18-25 years.

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