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EFFECT OF UJJAYI PRANAYAMA ON SELECTED PHYSIOLOGICAL VARIABLES

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Abstract
Introduction: Today yoga is being a subject of varied interest, gained world popularity. Recent research trends have shown that it can serve as an applied science in a number of fields such as education, physical education and sports, health and family welfare, psychology and medicine also one of the valuable means fort he development of human resources for the better performance and productivity however their exist controversy in accepting yoga as medicine and therapy because it generally been believed that yoga is a spiritual science having emancipation a s its goal and hence cannot be treated only as a therapy.
Pupose of Study: to investigate the effect of Ujjayi Pranayam on the selected physiological variables among female students studying in Bachelor of Physical Education degree at Lakshmibai National Institute of Physical Education, Gwalior.
Hypothesis: It was hypothesized that there will be a significant improvement in the selected physiological variables on the female students studying in Bachelor of Physical Education degree at Lakshmibai National Institute of Physical Education, Gwalior.
Research Methods and Procedures: 30 female students studying in Bachelor of Physical Education degree at Lakshmibai National Institute of Physical Education, Gwalior, India were selected randomly as the subjects for the study. Random group design was used for the purpose of the present study. First the subjects were divided into two equal groups by drawing a lot. Group "A" acted as experimental group and Group "B" acted as Control group. Both groups consist of fifteen subjects each. Prior to the administration of test pre test scores for all the selected variables were collected. After eight weeks of training post test scores were collected on each of the selected variables. Experimental group perform Ujjayi pranayam daily for 30 minutes. No training was imparted to the control group. To investigate the effect of Ujjayi Pranayam on selected physiological variables Analysis of Co Variance was used at .05 level of significance. For the purpose of the analysis of data Software SPSS for Windows (11.5 Version) and Microsoft Excel was used.
Results, Discussions and Conclusions: The analysis of co-variance was used to find out the effect of ujjayi pranayama on female students of B. P.E., Lakshmibai National Institute of Physical Education. It was observed that there was no significance difference in Resting Respiratory Rate, Blood Pressure, Vital Capacity, Maximum Breath Holding Time, Peak Flow Rate and Cardio Vascular Endurance. There was significant difference in Resting Heart Rate and Resting Pulse Rate. It was observed from the above findings that eight week training programme of Ujjayi Pranayama was found to be effective in case of Resting Heart Rate and Resting Pulse Rate where as it was not effective in case of Resting Respiratory Rate, Blood Pressure, Vital Capacity, Maximum Breath Holding Time, Peak Flow Rate and Cardio Vascular Endurance. In case of Resting Heart Rate findings of the present study was supported by Mertan where he concluded that during Ujjayi breathing without retention of breath the cardiac output increases while heart rate decrease in comparison to deep breathing of similar time reaction for inspiration and expiration. The characteristics features of Ujjayi are expected to be responsible for this effect.
Key words: ujjayi pranayama, Physical Education, Cardio Vascular Endurance

Introduction

Today yoga is being a subject of varied interest, gained world popularity. Recent research trends have shown that it can serve as an applied science in a number of fields such as education, physical education and sports, health and family welfare, psychology and medicine also one of the valuable means fort he development of human resources for the better performance and productivity however their exist controversy in accepting yoga as medicine and therapy because it generally been believed that yoga is a spiritual science having emancipation a s its goal and hence cannot be treated only as a therapy. Yoga has its own way of strengthening the weak part of the body. Research in the field of yoga have established that the yogic Asana, pranayam and Kriyas are the best and useful as they help not only to strengthen each organ and develop every muscle of the body but also regulate the circulation of body blood, purity of lungs, inspire the mind and thus develop the harmonious development of human personality. A variety of Yogic practices are being done by top sportsman/ Olympian athletes of many countries like Brazil, Argentina, Poland, Germany, Canada etc. as a form of conditioning or relaxation exercise. Pranayam is science of respiration. The author of Hatha Pradipika gives eight varieties of Pranayam, one of which is Ujjayi. The chief characteristics of the Ujjayi Pranayam is the Loud noise produces, as will be seen in the technique, by partial closer of the Glottis. This Pranayam is called Ujjayi to distinguish it from other varieties or congtore

is rendered to able, when we take into consideration the two following effects; first the prefix vd occurring in the name Ujjayi means aloud. Second Ujjayi, a variant reading noticed by Bhramananda in his commentary on Hatha Pradipika, actually means pronounced loudly. Pranayam include the circulation of blood and capable of producing very high pressure in the lungs and in the thorax. Pranayam is the one of the first exercise for a weak heart and weak lungs. If its physiology is properly known and if it is judiciously administered exercise is cap[able of giving wonderful results.

High abdomen pressure created in Pranayam by action and counter action of the different anatomical parts together with the upward area is responsible for awakening of kundalini.

Purpose of the study

The purpose of the study was to investigate the effect of Ujjayi Pranayam on the selected physiological variables among female students studying in Bachelor of Physical Education degree at Lakshmibai National Institute of Physical Education, Gwalior.

Hypothesis

On the basis of literature reviewed, research finding and scholar's own understanding of the problem it was hypothesized that there will be a significant improvement in the selected physiological variables on the female students studying in Bachelor of Physical Education degree at Lakshmibai National Institute of Physical Education, Gwalior

ii) Negative Breath Holding

6. Peak Flow Rate
7. Blood Pressure
   i) Systolic Blood Pressure
   ii) Diastolic Blood Pressure
8. Cardiovascular Endurance

Collection of data

Data were collected by administering tests on the Bachelor of Physical Education degree students in the college premises. The practice trial in each test as per the prescription was ensured to each subject before the actual testing. This was done to familiarize the subjects with the nature and the demand of test. The use of apparatus was explained to them prior to the administration of test.

Statistical procedure

To investigate the effect of Ujjayi Pranayam on selected physiological variables Analysis of Co

Methodology

For the purpose of present study 30 female students studying in Bachelor of Physical Education degree at Lakshmibai National Institute of Physical Education, Gwalior, India were selected randomly as the subjects for the study.

Experimental design

Random group design was used for the purpose of the present study. First the subjects were divided into two equal groups by drawing a lot. Group "A" acted as experimental group and Group "B" acted as Control group. Both groups consist of fifteen subjects each. Prior to the administration of test pre test scores for all the selected variables were collected. After eight weeks of training post test scores were collected on each of the selected variables. Experimental group perform Ujjayi pranayam daily for 30 minutes. No training was imparted to the control group.

Selection of variables

Following variables were selected for the purpose of present study:

1. Resting Heart Rate
2. Resting Pulse rate
3. Resting Respiratory Rate
4. Vital capacity
5. Breath Holding Time
   i) Positive Breath Holding

Variance was used at .05 level of significance. For the purpose of the analysis of data Software SPSS for Windows (11.5 Version) and Microsoft Excel was used.

Results and findings

Data were collected on thirty subjects belonging to two group i.e. one experimental and one control group to study the effect of Ujjayi Pranayam on selected physiological variable. The subjects were divided into two equal groups consisting of fifteen subjects each belonging to one experimental and one control group. Experimental group A was exposed to Ujjayi Pranayam and Control group B was not exposed to any Pranayam. Experimental group practiced for eight weeks. Data was analyzed using the Analysis of covariance at .05 level of significance. The subjects of both groups were compared on selected physiological variables. The results of analysis of covariance were presented through table 2 to 10.

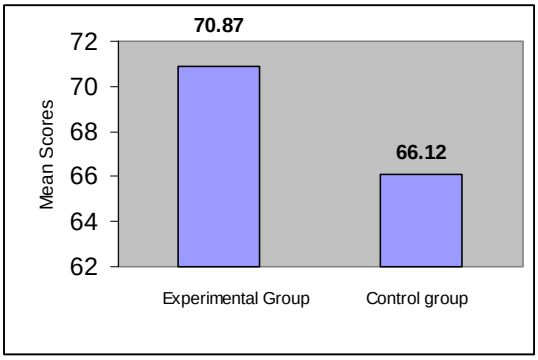


Fig. 1 Post Test Adjusted Means of Resting Heart Rate

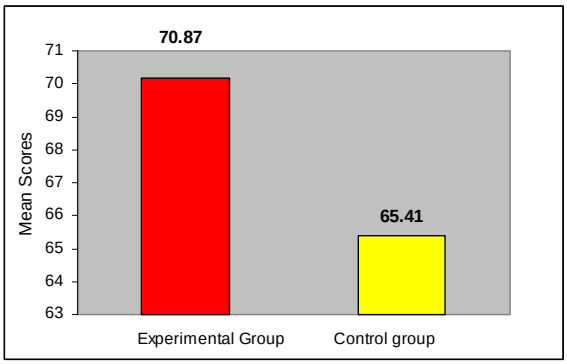


Fig. 2 Post Test Adjusted Means of Resting Pulse Rate

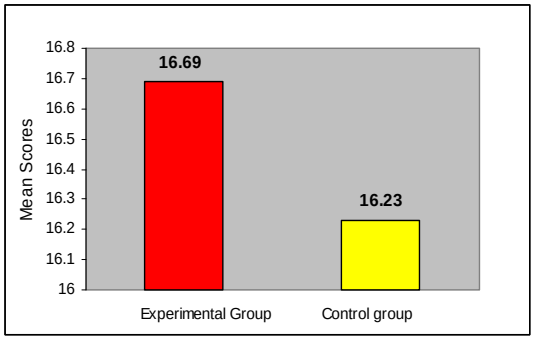


Fig. 3 Post Test Adjusted Means of Resting Respiratory Rate

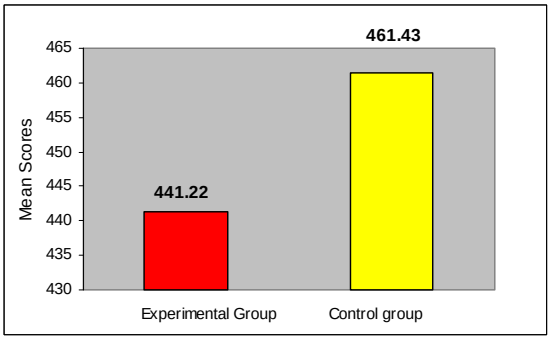


Fig. 4 Post Test Adjusted Means of Peak Flow Rate

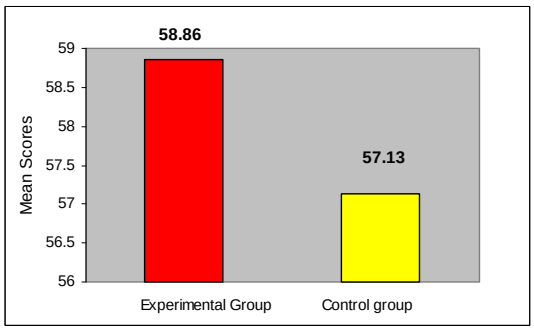


Fig. 5 Post Test Adjusted Means of Maximum Breath Holding (Positive)

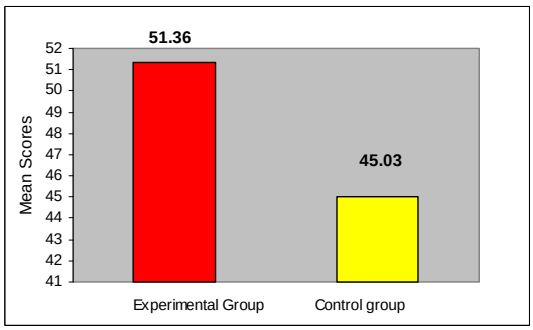
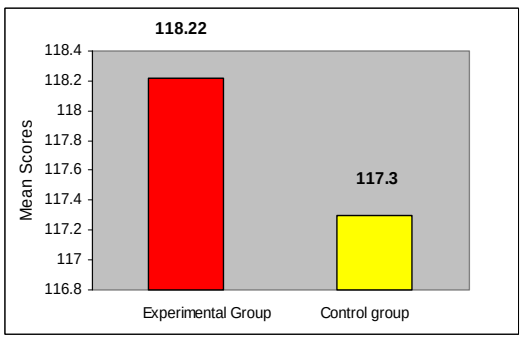


Fig. 6 Post Test Adjusted Means of Maximum Breath Holding (Negative)



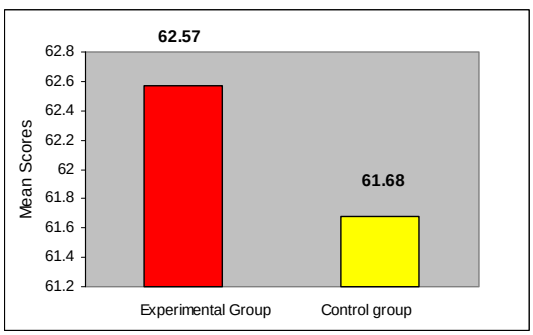


Fig. 7 Post Test Adjusted Means of Systolic Blood Pressure

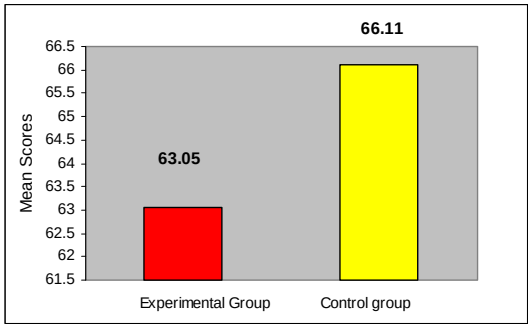


Fig. 8 Post Test Adjusted Means of Diastolic Blood Pressure

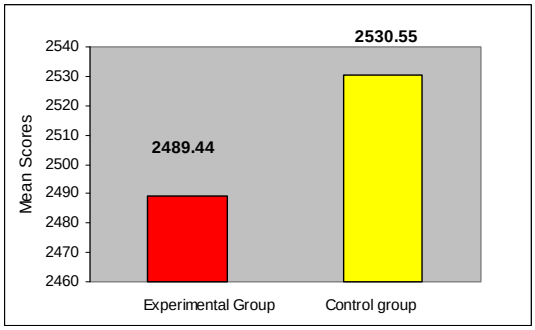


Fig. 9 Post Test Adjusted Means of Cardiovascular Endurance Capacity

Fig. 10 Post Test Adjusted Means of Vital Capacity

Table – 2. ANALYSIS OF COVARIANCE OF THE MEANS OF THE EXPERIMENTAL AND CONTROL GROUP FOR RESTING HEART RATE

S. No.	Test	Groups		df		Sum of Squares	Mean Sum of Squares	F Ratio
		Experimental A	Control B					
1.	Pre Test Means	71.933	69.933	A	1	30	30	.617
				W	28	1361.85	48.6	
2.	Post Test Means	71.2	65.8	A	1	218.703	218.70	5.285
				B	28	1158.79	41.386	
3.	Adjusted Post Test Means	70.872	66.128	A	1	165.125	165.125	4.405
				B	27	1012.07	37.484	

Table – 3. ANALYSIS OF COVARIANCE OF THE MEANS OF THE EXPERIMENTAL AND CONTROL GROUP FOR RESTING PULSE RATE

S. No.	Test	Groups		df		Sum of Squares	Mean Sum of Squares	F Ratio
		Experimental A	Control B					
1.	Pre Test Means	71.467	69.6	A	1	26.141	26.141	0.512
				W	28	1429.32	51.047	
2.	Post Test Means	70.467	65.133	A	1	213.328	213.328	5.463
				W	28	1093.46	39.052	
3.	Adjusted Post Test Means	70.186	65.414	A	1	167.742	167.742	4.696
				W	27	964.389	35.718	

Table – 4. ANALYSIS OF COVARIANCE OF THE MEANS OF THE EXPERIMENTAL AND CONTROL GROUP FOR RESTING RESPIRATORY RATE

S. No.	Test	Groups		df		Sum of Squares	Mean Sum of Squares	F Ratio
		Experimental A	Control B					
1.	Pre Test Means	18.6	19.00	A	1	1.2	1.2	0.084
				W	28	399.6	14.271	
2.	Post Test Means	16.6	16.3	A	1	0.533	0.533	0.052
				W	28	284.934	10.176	
3.	Adjusted Post Test Means	16.696	16.237	A	1	1.578	1.578	0.222
				W	27	192.104	7.115	

Table – 5. ANALYSIS OF COVARIANCE OF THE MEANS OF THE EXPERIMENTAL

AND CONTROL GROUP FOR PEAK FLOW RATE

S. No.	Test	Groups		df		Sum of Squares	Mean Sum of Squares	F Ratio
		Experimental A	Control B					
1.	Pre Test Means	394.667	436.667	A	1	13230	13230	1.553
				W	28	238556	8519.875	
2.	Post Test Means	427.333	475.333	A	1	17280	17280	2.524
				B	28	191666.5	6845.232	
3.	Adjusted Post Test Means	441.229	461.438	A	1	2901.938	2901.938	.898
				B	27	87214.398	3230.163	

Table – 6. ANALYSIS OF COVARIANCE OF THE MEANS OF THE EXPERIMENTAL AND CONTROL GROUP FOR MAXIMUM BREATH HOLDING (POSITIVE)

S. No.	Test	Groups		df		Sum of Squares	Mean Sum of Squares	F Ratio
		Experimental A	Control B					
1.	Pre Test Means	47	44	A	1	67.5	67.5	.382
				W	28	4946	176.643	
2.	Post Test Means	60.46	55.53	A	1	182.531	182.531	.655
				B	28	7801.469	278.624	
3.	Adjusted Post Test Means	58.862	57.13	A	1	22.006	22.006	0.277
				B	27	2143.543	79.390	

Table – 7. ANALYSIS OF COVARIANCE OF THE MEANS OF THE EXPERIMENTAL AND CONTROL GROUP FOR MAXIMUM BREATH HOLDING (NEGATIVE)

S. No.	Test	Groups		df		Sum of Squares	Mean Sum of Squares	F Ratio
		Experimental A	Control B					
1.	Pre Test Means	40.067	45.6	A	1	229.633	229.633	.328
				W	28	19610.535	700.376	
2.	Post Test Means	49.867	46.533	A	1	83.328	83.328	.289
				B	28	8085.469	288.767	
3.	Adjusted Post Test Means	51.369	45.031	A	1	297.772	297.772	3.49
				B	27	2303.527	85.316	

Table – 8. ANALYSIS OF COVARIANCE OF THE MEANS OF THE EXPERIMENTAL AND CONTROL GROUP FOR SYSTOLIC BLOOD PRESSURE

S. No.	Test	Groups		df		Sum of Squares	Mean Sum of Squares	F Ratio
		Experimental A	Control B					
1.	Pre Test Means	115	112.667	A	1	40.812	40.812	.323
				W	28	3543.34	126.548	
2.	Post Test Means	118.867	116.667	A	1	36.312	36.312	.547
				B	28	1859.062	66.395	
3.	Adjusted Post Test Means	118.228	117.305	A	1	6.331	6.331	.214
				B	27	798.715	29.582	

Table – 9. ANALYSIS OF COVARIANCE OF THE MEANS OF THE EXPERIMENTAL AND CONTROL GROUP FOR DIASTOLIC BLOOD PRESSURE

S. No.	Test	Groups		df		Sum of Squares	Mean Sum of Squares	F Ratio
		Experimental A	Control B					
1.	Pre Test	58.467	61.533	A	1	70.531	70.531	1.568

	Means			W	28	1259.469	44.981	
2.	Post Test Means	61.667	62.600	A	1	6.539	6.539	.192
				B	28	952.930	34.033	
3.	Adjusted Post Test Means	62.578	61.689	A	1	5.619	5.619	.299
				B	27	508.060	18.817	

Table – 10.ANALYSIS OF COVARIANCE OF THE MEANS OF THE EXPERIMENTAL AND CONTROL GROUP FOR CARDIOVASCULAR ENDURANCE

S. No.	Test	Groups		df		Sum of Squares	Mean Sum of Squares	F Ratio
		Experimental A	Control B					
1.	Pre Test Means	52.807	61.880	A	1	91.875	91.875	2.038
				W	28	1262.14	45.07	
2.	Post Test Means	56.307	67.287	A	1	219.250	219.250	2.316
				B	28	2650.58	94.664	
3.	Adjusted Post Test Means	63.053	66.114	A	1	65.527	65.527	0.849
				B	27	2083.90	77.182	

Table – 11.ANALYSIS OF COVARIANCE OF THE MEANS OF THE EXPERIMENTAL AND CONTROL GROUP FOR CARDIOVASCULAR ENDURANCE

S. No.	Test	Groups		df		Sum of Squares	Mean Sum of Squares	F Ratio
		Experimental A	Control B					
1.	Pre Test Means	2183.33	2546.66	A	1	990080	990080	6.522
				W	28	4250672	151809.714	
2.	Post Test Means	2333.33	2686.66	A	1	936320	936320	6.504
				B	28	4030672	143952.571	
3.	Adjusted Post Test Means	2489.442	2530.55	A	1	10269.562	10269.562	0.311
				B	27	891871.188	33032.266	

Discussion of findings

The analysis of co-variance was used to find out the effect of ujjayi pranayama on female students of B. P.E., Lakshmibai National Institute of Physical Education. It was observed that their was no significance difference in Resting Respiratory Rate, Blood Pressure, Vital Capacity, Maximum Breath Holding Time, Peak Flow Rate and Cardio Vascular Endurance.There was significant difference in Resting Heart Rate and Resting Pulse Rate. It was observed from the above findings that eight week training programme of Ujjayi Pranayama was found to be effective in case of Resting Heart Rate and Resting Pulse Rate where as it was not effective in case of Resting Respiratory Rate, Blood Pressure, Vital Capacity, Maximum Breath Holding Time, Peak Flow Rate and Cardio Vascular Endurance. (M.M. Gore, 1984, M.A Wenger, B.K. Bagchi, 1996). In case of Resting Heart Rate findings of the present study was supported by Mertan where he concluded that during Ujjayi breathing without retention of breath the cardiac output increases while heart rate decrease in comparison to deep breathing of similar time reaction for inspiration and expiration. The characteristics features of Ujjayi are expected to be responsible for this effect. Other observation made by the scholar could not be supported by other researcher. More over the duration of training period was 8 weeks might be too short period for bringing any significant change in Resting Respiratory Rate, Maximum Breath Holding Time, Blood Pressure, Vital Capacity, Peak Flow Rate and Cardio Vascular Endurance. Under these circumstances the scholar is unable to give appropriate reason for above observation of the study & more in depth study is needed to find out the cause effect of Ujjayi Pranayama on selected physiological variables. **(**S.V. Devanand, 1959; J. Mertan, M.V., Bhole, 1979; P.V. Karambelkar, R.R Deshapande, M.V. Bhole, 1983; G. Shankar, N.P. Giri, 1995)

Discussing of hypothesis

In case of Resting Heart Rate and Resting Pulse Rate, hypothesis that there will be a significant improvement in selected physiological variable was accepted.In case of Resting Respiratory Rate, Maximum Breath Holding Time, Blood Pressure, Vital Capacity, Peak Flow Rate, Cardio Vascular Endurance, hypothesis that there will be a significant improvement in selected physiological variable was not accepted**.,**

Conclusions

1. There was a significant difference in the Resting Heart Rate which revealed that there is a significant effect of the eight week training programme of Ujjayi Pranayama on female students of B.P.E.
2. There was a significant difference in the Resting Pulse Rate which revealed that there

is a significant effect of the eight week training programme of Ujjayi Pranayama on female friends of B.P.E.

3. There was no significant difference in the Peak Flow Rate which revealed that the eight week training programme of Ujjayi Pranayama was not effective in this variable.
4. There was no significant difference in the Blood Pressure which revealed that the eight week training programme of Ujjayi Pranayama was not effective in this variable.
5. There was no significant difference in the Maximum Breath Holding Time which revealed that the eight week training programme of Ujjayi Pranayama was not effective in this variable.
6. There was no significant difference in the Cardio Vascular Endurance which revealed that the eight week training programme of Ujjayi Pranayama was not effective in this variable.
7. There was no significant difference in the Vital Capacity which revealed that the eight week training programme of Ujjayi Pranayama was not effective in this variable.
8. There was no significant difference in the Resting Respiratory Rate which revealed that the eight week training programme of Ujjayi Pranayama was not effective in this variable.

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