

COMPARISON OF THE EFFECTS OF PILATES AND YOGA EXERCISE ON RESTING PULSE RATE AND RESPIRATORY RATE OF COLLEGE FEMALE STUDENTS

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ABSTRACT

The present study was designed to find out the effect of Pilates exercises, yogic practices and combined Pilates exercises and yogic practices on selected physiological variables among college female students. For this purpose, sixty (N=60) B Ed college female students studying various affiliated colleges to Tamilnadu Teachers Education University, Chennai, Tamilnadu India were selected randomly as subjects. The age of the subjects was ranged between 18-21 years. The subjects were assigned at random into four groups of fifteen each (n=15) namely, Pilates exercises, yogic practices, combined Pilates exercises and yogic practices and control group. Group-I underwent Pilates Exercises, Group-II underwent yogic practices, Group-III underwent combined Pilates exercises and yogic practices and Group-IV acted as control. The duration of the training period for all the three experimental groups was restricted to twelve weeks and the number of sessions per week was confined to three in a week. For combined Pilates exercises and yogic practices, the training period was restricted to alternative weeks for twelve weeks. Among various physiological variables Resting pulse rate and Respiratory rate were selected as dependent variable. Resting pulse rate was measured through pulse monitor and Respiratory Rate was measured through standard pulse oximeter. All the subjects were tested prior to and immediately after the training for the entire selected variable. The data obtained from the experimental groups before and after the experimental period were statistically analyzed with Analysis of covariance (ANCOVA). Whenever the 'F' ratio for adjusted posttest means was found to be significant, the Scheffe's Post hoc test was applied to determine the paired mean differences. The level of confidence was fixed at 0.05 level for all the cases. The results of the study showed that there was a significant difference among all the groups. Further the results of the study showed that combined Pilate's exercises and yogic practices group was found to be better than the Pilate's exercises group and yogic practices group in Resting Pulse Rate and Respiratory Rate.

Keywords: Pilates Exercises, Yogic Practices, Combined Pilates Exercises and Yogic Practices, Resting Pulse Rate, Respiratory Rate.

1. INTRODUCTION

Even in younger populations, physical inactivity is a significant risk factor for cardiovascular diseases. Increased blood pressure and resting heart rate are linked to sedentary behavior, and these two variables are independent predictors of subsequent cardiovascular events[1]. Blood pressure and heart rate are essential physiological markers that are regulated by humoral and neural mechanisms. Their regulation is largely controlled by the autonomic nervous system, and lifestyle changes like exercise can change how responsive it is[2].

Pilates was invented in the early 1900s by a man of German ancestry named Joseph Pilates. Pilates was first used to help patients with mobility issues at the end of World War I in a hospital on the Isle of Man, which is surrounded by both Ireland and the

United Kingdom. Pilates exercises were carried out with a shock-absorbing device supporting the body's lower extremities, and this method gained popularity as a means of accelerating a patient's recovery [3]. Initially, Pilates was used to encourage movement in the early phases of recovery by providing support when required. Through numerous experiences, Pilates evolved into a unique technique that integrated psychological and physical elements. People with back or neck injuries have been the main users of Pilates for years [2]. Despite its use as a dance-related exercise, Pilates has been increasingly sought after as a physical therapy technique [3].

Pilates training is more than just exercise; Pilates is more than a collection of movements chosen at random. Pilates is a physical and mental conditioning technique that can help people feel better overall, reduce stress, and improve their strength, flexibility, and coordination. Pilates can be beneficial to everyone. Based on the same principles as yoga, Pilates is an exercise style with Germanic overtones. Its main objective is to make the hips, lower back, and abdomen stronger and more flexible. The late Joseph Pilates developed this exercise in the 1920s to treat asthma and other chronic conditions. Its basic idea is to increase muscle strength, endurance, and flexibility while maintaining spine stability. Pilates is a very effective form of exercise that combines breath, flexibility, relaxation, strength, endurance, and yoga, a mind-body technique. [4].

The core concepts of yoga are the union of opposites, the influence of the external environment on the body, the desire and search for liberation in different forms, the union of one's individual consciousness with the Universal consciousness, and the pursuit of realizing and attaining one's true self. Yoga is the study, the way, the means, and the ultimate goal. Over its lengthy history, yoga has shown that it represents the work we will do to accomplish a goal, the path that will lead us to the ultimate goal, the progress we will make along the way, and, ultimately, the final product: the culmination of all our accomplishments. [5].

Regular yoga practice helps control and lower the incidence of hypertension, diabetes, and other conditions. Because yoga relaxes the body and breathing exercises tend to act on the control system of cardio-vascular functions, it can help treat hypertension [6].

A number of pathological conditions, including pneumonia, adverse cardiac events, and clinical deterioration, as well as stressors like emotional stress, cognitive load, heat, cold, physical exertion, and exercise exhaustion, can have an impact on the respiratory rate, a fundamental vital sign. Respiratory rate is more sensitive to these conditions than most other vital signs, and the availability of many efficient technological options for respiratory rate detection has important implications for sport, healthcare, and workplace settings [7]. The resting systolic blood pressure decreased at the end of the eighth week of Pilates, walking, and walking and Pilates. Resting diastolic blood pressure also dropped following walking and Pilates and walking exercises combined [8].

2. METHODOLOGY

The study was conducted on sixty (N=60) B.Ed college female students studying various affiliated colleges to Tamilnadu Teachers Education University, Chennai, Tamilnadu India were selected randomly as subjects. The age of the subjects was ranged between 18-21 years. The subjects were assigned at random into four groups of fifteen each (n=15) namely, Pilates exercises, yogic practices, combined Pilates exercises and yogic practices and control group. Group-I underwent Pilates Exercises, Group-II underwent yogic practices, Group-III underwent combined Pilates exercises and yogic practices and Group-IV acted as control. Three sessions per week were allowed during

the training period, which was limited to twelve weeks for each of the three experimental groups. The training duration was limited to alternate weeks for a total of twelve weeks for combined Pilates and yoga workouts. The dependent variables were chosen from a variety of physiological variables and included the Resting Pulse Rate and Respiratory Rate. A conventional pulse oximeter was used to measure the respiratory rate and the resting pulse rate, respectively [9] [10]. ANCOVA was used to statistically assess the data collected from the experimental groups prior to and following the experimental period. The Scheffe's Post hoc test was used to ascertain the paired mean differences whenever the 'F' ratio for adjusted posttest means was found to be significant. For each scenario, the degree of confidence was set at 0.05.

3. RESULTS AND DISCUSSIONS

The results of the analysis of covariance on particular physiological variables based on the pre, post, and adjusted test scores for the groups that engaged in yoga, Pilates exercises, combined yoga and Pilates exercises, and control are displayed in Table 1.

a) Resting Pulse Rate

Table 1: Values of Analysis of Covariance for Experimental Groups and Control Group on Resting Pulse Rate

Certain Variables	Adjusted Post test Means				Source of Variance	Sum of Squares	df	Mean Squares	'F' Ratio
	Pilates Exercises Group	Yogic Practices Group	Combined Pilates Exercises and Yogic Practices Group	Control Group					
Pre Test	74.47	74.67	74.60	74.13	Between Within	2.53 0.72	3 56	1.44 0.75	1.17
Post Test	72.20	72.07	71.93	74.33	Between Within	58.33 33.60	3 56	19.44 0.60	32.41*
Adjusted Post Test	72.20	71.92	71.84	74.57	Between Within	72.02 12.97	3 55	24.05 0.24	101.76*

* Significant at .05 level of confidence

Table value for df (3, 56) at 0.05 level = 2.76 Table value for df (3, 55) at 0.05 level = 2.78

Table-1 shows the means values of Resting Pulse Rate before the test was 74.47, 74.67, 74.60 and 74.13 for the Pilates Exercises group, the Yogic Practices group, the Combined Pilates Exercises and Yogic Practices group, and the Control group, as indicated in Table 1. At the 0.05 level of confidence, the calculated F-ratio of 1.17 for the corrected posttest mean is less than the table value of 2.76 for df 3 and 56 required for significance. Posttest mean Resting Pulse Rate values are 72.20, 72.07, 71.93 and 74.33 for the Pilates Exercises group, Yogic Practices group, Combined Pilates Exercises and Yogic Practices group, and Control group, respectively. The adjusted posttest mean's obtained F-ratio of 32.41 is below the table values of 2.76 for df 3 and 56 that are necessary for significance at the 0.05 level of confidence.

The adjusted posttest means value of the Resting Pulse Rate for the groups that engaged in Pilates exercises, yogic practices, combined yogic practices and Pilates exercises, and control is 72.20, 71.92, 71.83 and 74.57, respectively, as shown in Table 1. At the 0.05 level of confidence, the adjusted posttest means computed F-ratio of 101.76 is higher than the table value of 2.78 for df 3 and 55 required for significance.

The results of the study demonstrate that there was a significant variation in the corrected post-test means of the experimental groups with respect to the increase in resting pulse rate. To determine which of the paired means had a significant difference, Scheffe's test was employed as a post hoc test; the results are displayed in Table 2.

Table 2: The Scheffe's test for the differences between the adjusted posttests paired means on Resting Pulse Rate

Certain Variables	Adjusted Post test Means				Mean Difference	Confidence Interval
	Pilates Exercises Group	Yogic Practices Group	Combined Pilates Exercises and Yogic Practices Group	Control Group		
Resting Pulse Rate	72.20	71.92			0.28	0.51
	72.20		71.84		0.36	0.51
	72.20			74.57	2.37*	0.51
		71.92	71.84		0.09	0.51
		71.92		74.57	2.65*	0.51
			71.84	74.57	2.73*	0.51

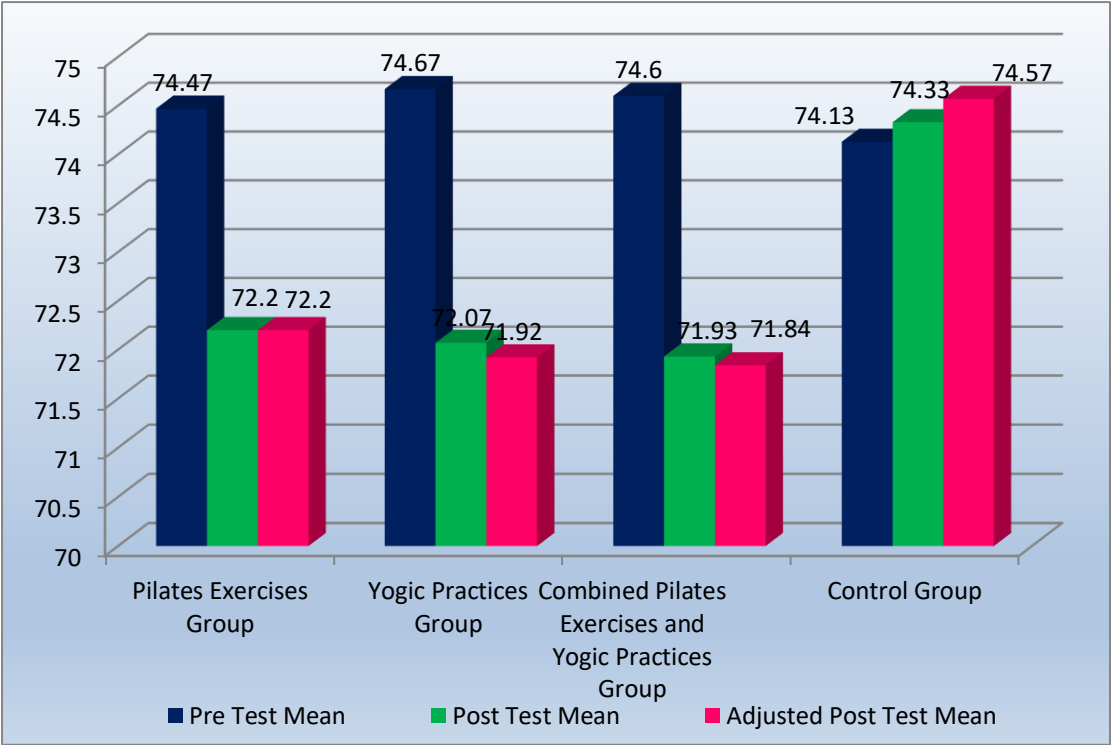
** Significant at 0.05 level of confidence*

Table-2 shows that the adjusted posttest means differences on Resting Pulse Rate between the Pilates Exercises group and the Control group, the Yogic Practices group and the Control group, and the combined Pilates Exercises and Yogic Practices group and Control group are shown in Table 2 as 2.37, 2.65 and 2.73, respectively. These differences are greater than the confidence interval value of 0.51 and demonstrate significant differences at the 0.05 level of confidence.

Table 2 also demonstrates that the adjusted posttest means for the differences in Resting Pulse Rate between the Pilates Exercises group and the Yogic Practices group, the Pilates Exercises group and the Combined Pilates Exercises and Yogic Practices group, and the Yogic Practices group and the Combined Pilates Exercises and Yogic Practices group are 0.28, 0.36 and 0.09 respectively, which are less than the confidence interval value of 0.51, which shows there is no significant differences at 0.05 level of confidence.

The study's findings showed that the adjusted posttest averages of the Pilates Exercises group and the Control group, the Yogic Practices group and the Control group, and the combined Pilates Exercises and Yogic Practices group and the Control group all differed significantly in terms of resting pulse rate. Further, the study's findings showed that there was no statistically significant difference in Resting Pulse Rate between the groups that participated in Pilate’s exercises and yogic practices, Pilates exercises and combined yogic and Pilates practices, and yogic practices group and combined yogic and Pilates exercises. However, compared to other groups, the Combined Pilates Exercises and Yogic Practices group significantly increased resting pulse rate. It may be concluded that the Combined Pilates Exercises and Yogic Practices group has exhibited better than the other experimental groups in decreasing Resting Pulse Rate. The mean value of experimental groups on Resting Pulse Rate is graphically represented in the Figure -1.

Fig-1: Bar diagram on ordered means of Resting Pulse Rate



b) Respiratory Rate

Table 3: Values of Analysis of Covariance for Experimental Groups and Control Group on Respiratory Rate

Certain Variables	Adjusted Post test Means				Source of Variance	Sum of Squares	df	Mean Squares	‘F’ Ratio
	Pilates Exercises Group	Yogic Practices Group	Combined Pilates Exercises and Yogic Practices Group	Control Group					

Pre Test	20.00	20.07	19.53	18.80	Between	15.33	3	5.11	1.50*
					With in	191.07	56	3.41	
Post Test	17.20	17.33	16.40	19.07	Between	56.73	3	18.91	6.78*
					With in	156.27	56	2.79	
Adjusted Post Test	16.99	17.09	16.43	19.48	Between	78.49	3	26.16	13.80*
					With in	104.28	55	1.90	

** Significant at 0.05 level of confidence*

Table value for df (3, 56) at 0.05 level = 2.76 Table value for df (3, 55) at 0.05 level = 2.78

Table -3 shows that the mean values of Respiratory Rate before the test was 20.00, 20.07, 19.53 and 18.80 for the Pilates Exercises group, the Yogic Practices group, the Combined Pilates Exercises and Yogic Practices group, and the Control group. At the 0.05 level of confidence, the calculated F-ratio of 1.50 for the corrected posttest mean is less than the table value of 2.76 for df 3 and 56 required for significance. Posttest mean Respiratory Rate values are 17.20, 17.33, 16.40 and 19.07 for the Pilates Exercises group, Yogic Practices group, Combined Pilates Exercises and Yogic Practices group, and Control group, respectively. The adjusted posttest mean's obtained F-ratio of 6.78 is below the table values of 2.76 for df 3 and 56 that are necessary for significance at the 0.05 level of confidence.

The adjusted posttest means value of the Respiratory Rate for the groups that engaged in Pilates exercises, yogic practices, combined yogic practices and Pilates exercises, and control is 16.99, 17.09, 16.43 and 19.48 respectively, as shown in Table 3. At the 0.05 level of confidence, the adjusted posttest means computed F-ratio of 13.80 is higher than the table value of 2.78 for df 3 and 55 required for significance.

The results of the study demonstrate that there was a significant variation in the corrected post-test means of the experimental groups with respect to the increase in Respiratory Rate. To determine which of the paired means had a significant difference, Scheffe's test was employed as a post hoc test; the results are displayed in Table 4.

Table 4: The Scheffe's test for the differences between the adjusted posttests paired means on Respiratory Rate

Certain Variables	Adjusted Post test Means				Mean Difference	Confidence Interval
	Pilates Exercise Group	Yogic Practices Group	Combined Pilates Exercises and Yogic Practices Group	Control Group		

Respiratory Rate	16.99	17.09			0.10	1.45
	16.99		16.43		0.56	1.45
	16.99			19.48	2.49*	1.45
		17.09	16.43		0.66	1.45
		17.09		19.48	2.39*	1.45
			16.43	19.48	3.05*	1.45

*** Significant at 0.05 level of confidence**

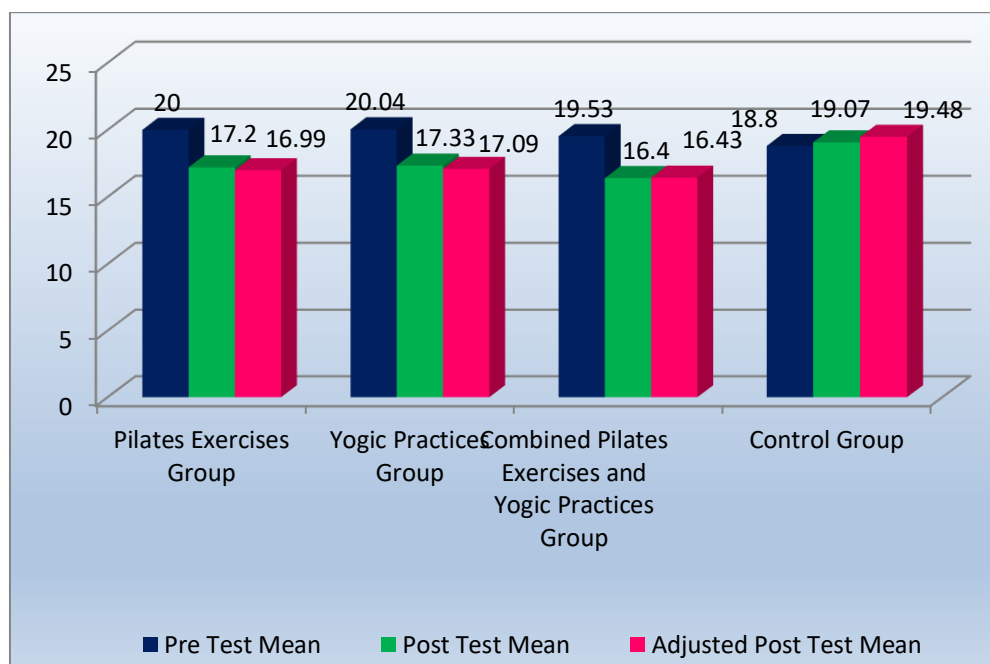
The adjusted posttest means differences on Respiratory Rate between the Pilates Exercises group and the Control group, the Yogic Practices group and the Control group, and the combined Pilates Exercises and Yogic Practices group and Control group are shown in Table 4 as 2.49, 2.39 and 3.05, respectively. These differences are greater than the confidence interval value of 1.45 and demonstrate significant differences at the 0.05 level of confidence.

Table 4 also demonstrates that the adjusted posttest means for the differences in Respiratory Rate between the Pilates Exercises group and the Yogic Practices group, the Pilates Exercises group and the Combined Pilates Exercises and Yogic Practices group, and the Yogic Practices group and the Combined Pilates Exercises and Yogic Practices group are 0.10, 0.56 and 0.66 respectively, which are less than the confidence interval value of 1.45, which shows there is no significant differences at 0.05 level of confidence.

The study's findings showed that the adjusted posttest averages of the Pilates Exercises group and the Control group, the Yogic Practices group and the Control group, and the combined Pilates Exercises and Yogic Practices group and the Control group all differed significantly in terms of Respiratory Rate. Further, the study's findings showed that there was no statistically significant difference in Respiratory Rate between the groups that participated in Pilate's exercises and yogic practices, Pilates exercises and combined yogic and Pilates practices, and yogic practices group and combined yogic and Pilates exercises. However, compared to other groups, the Combined Pilates Exercises and Yogic Practices group significantly increased Respiratory Rate.

It may be concluded that the Combined Pilates Exercises and Yogic Practices group has exhibited better than the other experimental groups in decreasing Respiratory Rate. The mean value of experimental groups on Respiratory Rate is graphically represented in the Figure -2.

Fig-2: Bar diagram on ordered means of Respiratory Rate



4. CONCLUSIONS

The data analysis led to the following findings being made.

1. In the selected criterion variable, such as Resting Pulse Rate and Respiratory Rate, significant differences in achievement were discovered between the Pilates Exercises group, Yogic Practices group, Combined Pilates Exercises and Yogic Practices group, and Control group.
2. The Resting Pulse Rate and Respiratory Rate considerably increased in the experimental groups, which included the Pilates exercises group, the yogic practices group, and the combined Pilates exercises and yogic practices group.
3. In terms of improving Resting Pulse Rate and Respiratory Rate, the combined Pilate's exercises and yogic practices group performed better than the Pilates exercises group, the yogic practices group, and the Control group.

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