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**Abhilash SS**  
Assistant Professor of Physical Education, Govt. Arts and Science College, Uduma, Kasaragod, Kerala, India

**Dr. George Joseph**  
Associate Professor of Physical Education, RIT, Pampady, Kerala, India

**Correspondence**  
**Abhilash SS**  
Assistant Professor of Physical Education, Govt. Arts and Science College, Uduma, Kasaragod, Kerala, India

## Effects of Pilates exercise, power yoga, and high-intensity interval training on muscular endurance among male school students

**Abhilash SS and Dr. George Joseph**

### Abstract

The study was conducted to find the effect of Pilates exercise, power yoga and High-Intensity Interval Training on muscular endurance among male school students. Sixty (N=60) male students studying in Govt. Higher Secondary School, Kuniya, Kasaragod, India during the year 2018-2019 were randomly selected as subjects. The subjects were assigned at random into four groups of fifteen each (n=15). Group I underwent Pilates training, Group II underwent Power yoga Practice, Group III underwent Interval training and Group IV acted as Control group. The dependent variable selected for this study was muscular endurance. Muscular endurance was assessed by the Bent Knee Sit-ups test. All the subjects were tested prior to and immediately after the training for the selected variable, Muscular endurance. Data were collected and statistically analyzed using ANCOVA. Scheffe's post hoc test was applied to determine the significant difference between the paired means. In all the cases 0.05 level of significance was fixed. The results of the study showed that there was a significant difference among all the experimental groups namely Pilates exercise, Power yoga Practice, and High-Intensity Interval Training on Muscular endurance. Further, the results of the study showed Interval training group to be better than the Pilates group and Power yoga Practice group in Muscular endurance.

**Keywords:** Interval training, power yoga practice, Pilates exercise, muscular endurance

### Introduction

Pilates is a form of exercise, developed by Joseph Pilates, which emphasizes the balanced development of the body through core strength, flexibility, and awareness in order to support the efficient, graceful movement.

Pilates is a physical fitness system developed in the early 20th century by Joseph Pilates. It is practiced worldwide, and especially in western countries such as Canada, the United States and the United Kingdom. As of 2005, there were 11 million people practicing the discipline regularly and 14,000 instructors in the United States (Ellin, 2005).

Muscular Endurance is the ability of a muscle group to apply force repeatedly or to sustain concentration for a period of time (Robert 1989).

Power Yoga is a discipline of regular practice for strengthening the core muscle groups, increasing flexibility and overall range of motion, enhancing your coordination and getting rid of stress. Reducing stress alone, has been proven to greatly reduce weight gain, so in combination with one of the best calorie-burning workouts, Power Yoga stands above all other workouts for weight loss.

There are many different forms of yoga and Power yoga is one of them. The word "power" in the phrase describes the intensity this kind of yoga involves. Most of the exercises in Power yoga are modeled on the Ashtanga style of yoga. Both these kinds of yoga (Power and Ashtanga) use the Vinyasa poses.

Interval training is a structured and sophisticated way of fast tracking the fitness training, and since there is rest periods along the length of the training, recovery is achieved by maintaining movement throughout the entire workout, which in turn helps in the removal of lactic acid and other waste products. The interval training programmes manipulate the intensity and duration of the work intervals, and the length of the rest periods, to create the desired training responses.

A complete training programme usually comprises several short, alternating periods of both higher and lower intensity exercises.

**Methodology**

The study was conducted on sixty (N=60) male students studying in Govt. Higher Secondary School, Kuniya, Kerala during the year 2018-2019. The Subjects were randomly assigned equally into four groups. Group I underwent Pilates training, Group II underwent Power yoga, Group III underwent Interval training and Group IV acted as Control group. The experimental groups underwent the respective training for a period of 12 weeks (3 days/week), whereas the control group continued their daily activities without any change to their normal routine.

Among the various Physical fitness parameters, only muscular endurance was selected as the dependent variable and it was

assessed by the Bent Knee Sit-ups test. All the four groups were tested on muscular endurance and results were analyzed before and after the training period.

**Analysis of Data**

The data collected from the experimental groups and control group prior to and after the study on selected variables were statistically examined by analysis of covariance (ANCOVA) and it was used to determine differences, if any among the adjusted post-test means on selected criterion variables separately. Whenever they obtained f-ratio value in the simple effect was significant the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases 0.05 level of significance was fixed.

The Analysis of covariance (ANCOVA) on muscular endurance of Experimental Groups and Control group have been analyzed and presented in Table –1

**Table 1:** Values of Analysis of Covariance for Experimental Groups and Control Group on muscular endurance

Variable	Adjusted post test mean				Source of Variance	Sum of Sequence	df	Mean Square	'F' Ratio
	Pilates Exercise Group I	Power yoga practice Group II	High Intensity Interval Training Group III	Control Group IV					
Muscular Endurance	17.30	17.99	18.75	14.56	Between within	150.00 38.79	3 55	50.00 0.71	70.89*

\* Significant at .05 level of confidence (The table value required for Significance at 0.05 level with df 3 and 55 is 2.77)

Table-1 shows that the adjusted post test mean value of Muscular Endurance for Pilates exercise group, Power yoga practice group, Interval training group and control group is 17.30, 17.99, 18.75, and 14.56 respectively. The obtained F-ratio of 70.89 for the adjusted post-test mean is more than the table value of 2.77 for df 3 and 55 required for significance at 0.05 level of confidence.

The results of the study indicate that there are significant differences among the adjusted post-test means of experimental groups on the increase of Muscular Endurance.

To determine which of the paired means had a significant difference, Scheffe's test was applied as Post hoc test and the results are presented in Table-2

**Table 2:** The Scheffe's test for the differences between the adjusted post-tests paired means on Flexibility and Muscular Endurance

Adjusted Post-test Means				Mean Difference	Confidence Interval
Pilates Exercise Group (I)	Power Yoga Practice Group (II)	High intensity Interval Training Group (III)	Control Group (IV)		
17.30	17.99	--	--	0.69*	0.53
17.30	--	18.75	--	1.45*	0.53
17.30	--	--	14.56	2.74*	0.53
--	17.99	18.75	--	0.76*	0.53
--	17.99	--	14.56	3.43*	0.53
--	--	18.75	14.56	4.19*	0.53

\* Significant at .05 level of confidence

Table 2 shows the adjusted post-test mean differences between the Pilates exercise group and Power yoga practice group, Pilates exercise group and High-Intensity Interval training group, Pilates exercise group and Control group, Power yoga practice group and High-Intensity Interval training group, Power yoga practice group and control group, High-Intensity Interval training group and Control group are 0.69, 1.45, 2.74, 0.76, 3.43 and 4.19 respectively and they are greater than the confidence interval value 0.53, which shows significant differences at 0.05 level of confidence.

The results of the study further have revealed that there is a significant difference in Muscular Endurance between the adjusted post test means of Pilates exercise group and power yoga practice group, Pilates exercise group and High-Intensity Interval training group, Pilates exercise group and Control group, Power yoga practice group and High-Intensity Interval training group, Power yoga practice group and control group, High-Intensity Interval training group and Control group. However, the improvement in Muscular Endurance was

significantly higher for High-Intensity Interval training group than other experimental groups.

It may be concluded that the High-Intensity Interval training group has exhibited better than the other experimental groups in improving Muscular Endurance.

**Conclusion**

From the analysis of the data, the following conclusions were drawn.

1. Significant differences in achievement were found between Pilates exercise group, Power yoga Practice group, High Intensity Interval training group and Control group in the selected criterion variable such as muscular endurance.
2. The Experimental groups namely, Pilates exercise group, Power yoga Practice group, High Intensity Interval Training group and Control group had significantly improved in Physical variable such as muscular endurance.

3. The High-Intensity Interval Training group was found to be better than the Pilates exercise group, Power yoga Practice group, and Control group in increasing muscular endurance.

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