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Research Article

EFFECT OF CYCLE ERGOMETER TRAINING AND PLYOMETRIC TRAINING ON SELECTED PHYSICAL AND PHYSIOLOGICAL VARIABLES AMONG COLLEGE STUDENTS

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ABSTRACT

The purpose of this study was find out the Effect of Cycle Ergo Meter Training and Plyometric Training on Selected Physical and Physiological Variables among college students. Thirty subjects were randomly selected from Agricultural Engineering College and Research Institute, Kumulur, Trichy Dist,Tamil Nadu. The subject's age ranged between 17-23 years only. They were randomly divided into three equal groups. cycle ergo meter training group, plyometric training group were considered as two experimental groups and the other group was control group. The study was formulated as pre and post test pre experimental design. The analysis of covariance (ANCOVA) was applied to find out the variance in each criterion variable. The level of significance to test and 'F' ratio, obtained by the analysis of co-variance was fixed at 0.05 level of confidence. The significant improvement in leg explosive power and vo2 max for plyometric training followed by cycle Ergo meter training and control group. There would be a no significant difference between plyometric training and cycle Ergo meter training on leg explosive power and vo2 max.

INTRODUCTION

Sport training is a systematic process extending over a long period. For best result the system of training has to be based and conducted on scientific factors and lines where it is not possible to do that, the training has to be based on the results successful practice which has withstood the test of time sport. Physical training aims at improving the performance of sports persons. The sports performance depends on several factors. The performance of sports primarily depends on his performance capacity, such as speed, strength and endurance.

It is competitive physical activity using bicycles. There are several categories of bicycle racing including road bicycle racing, time trialing, cycle-cross, mountain bike racing, track cycling and cycle speedway. Non-racing cycling sports include artistic cycling, cycle polo and mountain bike trials. The Union Cyclist International is the world governing body for cycling and international competitive cycling events. Bicycle is a very efficient method of locomotion. Speed and strength are integral components of fitness found in varying degrees in virtually all athletic movements. The combination of speed and strength is called power. For many years, coaches and athletes have sought to improve power in order to enhance performance. In recent years, this distinct method of training for power or explosiveness has been termed plyometrics. Plyometrics is a type of training involving jumping; bounding and other high impact exercises that focus on maximizing the stretch reflex of the muscles. To teach the muscles to produce maximum force faster this enhances performance for.The bicycle ergo meter is the common to perform as indoor aerobic exercises. .Bicycle ergo meter is exercise is similar to cycling. The intensity of exercise can be changed by varying the amount of resistance. **Chelly *et al.* (2001)** suggested that the power that an individual can develop depends on both force and velocity, as determined by friction-loaded ergo meters. Cycle ergo meter a fixed cycling machine used in fitness testing to estimate the exercise intensity (power output) from the rpm and the resistance to pedaling, which can be adjusted to vary the intensity. Bicycle ergo meter is a non weight bearing exercise (Kisan. *et al*, 2012).

Purpose

The purpose of the study was to compare the Effect of Cycle Ergo Meter Training and Plyometric Training on Selected Physical (leg explosive power) and Physiological Variables (Vo_2 max) among college students.

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Hypotheses

The improvement of leg explosive power and Vo_2 max of the male students after the cycle ergo meter training is superior to that after the plyometric training and control group.

Objectives of the Study

To find out the Effect of Cycle Ergo Meter Training and Plyometric Training on Selected Physical (leg explosive power) and Physiological Variables (Vo2 max) among college students.

METHODS AND PROCEDURES

Selection of the subjects: The study was thirty subjects were randomly selected from Agricultural Engineering College and Research Institute, Kumulur, Trichy Dist, Tamil Nadu. The subject's age ranged between 17-24 years. They were randomly selected in thirty students divided into three equal groups. cycle ergo meter training group, plyometric training group were considered as two experimental groups and the other group was control group. The study was formulated as pre and post test pre experimental design.

Selection of Variables

Dependent Variables

Physical Variable

Leg explosive power

Physiological Variable

Vo_2 max

Independent Variables

Experimental group I - Cycle ergo meter training
Experimental group II - Plyometric training
Control group - No training

Criterion Measures

Before and after the training period, the selected variables were measured by using standard testing procedures.

1. Leg explosive power was measured by standing broad jump and recorded in meters.
2. Vo_2 max was measured by Step Test and recorded $Ml/kg^{-1}/min^{-1}$.

Training Programme

Procedure of Cycle ergo meter training*:* Ten participants underwent a supervised cycle ergo meter training program lasting for twelve weeks, three days per week, with a 30-minute structured exercise session. Each session consisted of a warm-up, an aerobic phase, and cool down. The exercise intensity was individually prescribed using a bicycle ergo meter but within 50%–75% of the maximal heart rate range for participants. The bicycle Ergo meter exercise started with the participants sitting on the bicycle with initial resistance of 10–20 watts (warm-up phase) that was gradually increased by 5–10 watts after 3 minutes .The resistance was gradually reduced 5 minutes before the end of the session (cool down phase).

***Procedure of plyometric training*:** A 12-week plyometric-training program was developed that included weekly three days training sessions. 1. Side to side ankle hops; 2. Spot Jump and reach 3. Front cone hops Jumps 4. Multiple Hop 5. Double leg hops 6. Lateral jump single leg these exercises were performed for the duration of the training periods 60 minutes.

Experimental Design

For the study pre test & post test randomized group design, which consists of one control group (n=10) and Experimental group-I (n=10), Experimental group-II (n=10) was used. Equal numbers of subjects were assigned randomly to the group. Experimental group One served as Cycle ergo meter training, Experimental group two served as plyometric training anther one group was served as control group.

Collection of data

Before the administration of Cycle ergo meter training and plyometric training, the selected tests for physical and physiological variables were administered on both the experimental and control groups to collect pretest data. After the completion of twelve weeks of Cycle ergo meter training and plyometric training again the same tests were conducted to collect the post training data. Necessary instructions were given to the subjects before administration of the tests.

Statistical Procedure

The data were analyzed by applying descriptive statistical, Analysis of Co-Variance (ANCOVA) and scheffe's post hoc tests were used to examine the significance between the variables for testing groups. The data analyzed with the help of SPSS (20.0 version) software and the level of significance was set at 0.05 level of confidence.

Table I Analysis of Covariance for the pre and post-test data on Leg Explosive Power (Scores in meters)

	Ergo cycle training	Plyo metric training	Control group	Sov	Sum of square	Df	Mean squares	F ratio
Pre test mean	1.20	1.22	1.21	B	0.003	2	0.001	**0.019**
				W	1.39	27	0.052	
Post test mean	1.94	1.93	1.22	B	3.36	2	1.68	**27.36***
				W	1.65	27	0.061	
Adjsted post test mean	1.94	1.92	1.21	B	3.43	2	1.71	**54.43***
				W	0.820	26	0.032	

***Significant at 0.05** (Table F-value at 0.05 level of confidence for 2 and 27 (df) =3.35, 2 and 26 (df) =3.37)

RESULTS

Table-1 shows the analyzed data on Leg Explosive Power assessed through standing broad jump. Pre test means for Ergo cycle training, plyometric training group and control group were 1.20, 1.22 and 1.21 respectively. The obtained F ratio 0.019 was less than the required table value of 3.35. Hence the pre test was not significant. The post test means were, 1.94, 1.93 and 1.22 respectively. The obtained F ratio was 27.36 which were greater than the required Table value of 3.35. Hence the post test was significant at 0.05 level of confidence for the degrees of freedom 2 and 27.The adjusted post test

means were 1.94, 1.92, and 1.21 respectively. The obtained F ratio was 54.43 which were greater than the required table value of 3.37. Hence it was significant at 0.05 level of confidence for the degrees of freedom 2 and 26. This proved that there were significant differences among the means due to twelve weeks cycle Ergo meter training and plyometric training on leg explosive power.

Table 2 Analysis of Covariance for the Pre and Post-Test Data on Vo_2 Max (Beats per minute)

	Ergo cycle training	Plyometric training	Control group	Sov	Sum of square	df	Mean squares	F ratio
Pre test mean	46.60	48.90	45.60	B	57.26	2	28.63	**2.23**
				W	345.70	27	12.80	
Post test mean	49.85	51.80	45.20	B	229.93	2	114.96	**8.96***
				W	346.23	27	12.82	
Adjusted post test mean	50.23	50.11	46.49	B	84.14	2	42.07	**16.67***
				W	65.61	26	2.52	

***Significant at 0.05** (Table F-value at 0.05 level of confidence for 2 and 27 (df) =3.35, 2 and 26 (df) =3.37)

Table II shows the analyzed data on vo_2 max assessed through step test. Pre test means for Ergo cycle training, plyometric training group and control group were 46.60, 48.90 and 45.60 respectively. The obtained F ratio 2.23 was less than the required table value of 3.35. Hence the pre test was not significant. The post test means were, 49.85, 51.80 and 45.20 respectively. The obtained F ratio was 8.96 which were greater than the required Table value of 3.35. Hence the post test was significant at 0.05 level of confidence for the degrees of freedom 2 and 27.The adjusted post test means were 50.23, 50.11, and 46.49 respectively. The obtained F ratio was 16.67 which were greater than the required table value of 3.37. Hence it was significant at 0.05 level of confidence for the degrees of freedom 2 and 26. This proved that there were significant differences among the means due to twelve weeks cycle Ergo meter training and plyometric training on vo2 max.

This proved that there were significant differences among the means due to twelve weeks cycle Ergo meter training and plyometric training on vo2 max.

Table 3 Scheffee's Post - hoc Test for Mean Differences between Groups

	Ergo cycle Training	Plyometric Training	Control Group	Mean Differences	C.I value
Leg	1.94	1.92	-	0.02	
Explosive	1.94	-	1.21	**0.73***	**0.09**
Power	-	1.92	1.21	**0.71***	
	50.23	50.11	-	0.12	
Vo_2 Max	50.23	-	46.49	**3.74***	**0.83**
	-	50.11	46.49	**3.62***	

*** Significant at .05 level**

Table - III shows that mean difference in leg explosive power between Bicycle Ergo meter Training and Plyometric Training 0.02 the less than CI value of 0.09. There was no significant. Bicycle Ergo meter Training and control group 0.73 and Plyometric Training and control group 0.71 greater than CI value of 0.09. There was a significant difference between groups. The mean difference in vo_2 max between Bicycle Ergo meter Training and Plyometric Training 0.12 the less than CI value of 0.83. There was no significant. Bicycle Ergo meter Training and control group 3.74 and Plyometric Training and control group 3.62 greater than CI value of 0.83. There was a significant difference between groups.

DISCUSSION ON FINDINGS

The aim of this study was to the Effect of Cycle Ergo Meter Training and Plyometric Training on Selected Physical (leg explosive power) and Physiological Variables (Vo2 max) among college students. The findings of the study are supported by the following researchers. Zahara K. Polen, Snehal Joshi (2014) According to the study conducted the increase in Vo2 values post treadmill training and cycle ergo meter training were found to be extremely significant. No significant difference was seen between the improvements in two groups. This study concludes that, treadmill and bicycle ergo meters are equally effective in improving functional exercise capacity. Steven F. Loy and others (1994). The purpose of this study was to determine the physical and physiologic changes induced by 9 weeks of equivalent amounts of high□intensity running and cycle ergo meter training. Both groups significantly improved treadmill VO_2 and cycle ergo meter peak VO There was no difference in the amount of improvement between the groups on each test. Balsam P and others (2013) The effect of cycle ergo meter exercise training on improvement of exercise capacity in patients after myocardial infarction. this study was 12 training sessions resulted in a statistically significant increase in VO□ peak.

CONCLUSION

There would be a significant improvement for both the training group after their respective training programme. Plyometric training group significant improvement in leg explosive power and vo_2 max compared to control group.Bicycle ergo meter training group significant improvement in leg explosive power and vo_2 max compared to control group.There would be a no significant difference between plyometric training and cycle Ergo meter training on leg explosive power and vo_2 max.

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