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Effect of callisthenic exercises, aerobics and yogasanas on physiological variables of primary school Children

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Abstract

The purpose of investigator is to compare Resting Pulse Rate Performance of “Effect of Callisthenic Exercises, Aerobics and Yogasanas on Physiological Variables of Primary School Children’s”. The selected subjects were divided into three Experimental Groups and a Control Group with Twenty-Five subjects in each (n=25) Experimental Group-I underwent Callisthenic Exercises, (n=25) Experimental Group-II underwent Aerobics Exercises, (n=25) Experimental Group-III underwent Yogasanas and (n=25) Control Group-IV served as Control Group for the training period of Twenty-One (21) Weeks. The Total Sample Consists 100 Girls and the Age Levels were 09 to 12 Years.

Keywords: Callisthenic, aerobics exercises, Yogasanas and physiological variable

Introduction

Physical Education is sum of those experiences which come to the individual through movement. Physical Education, an integral part of the total education process, is a field of Endeavour that as its aim the improvement of human performance through the medium of physical activities that have been selected with a view to realizing this outcome.

Systematic and rhythmic body exercises generally performed without or weight that consists of bending, twisting, swinging, kicking and jumping movements and such specific exercises as push-ups, sit-ups and chin-ups.

Aerobic Exercises is sometimes known as cardio-exercise that requires pumping of oxygenated blood by the heart to deliver oxygenated blood by the heart to deliver oxygen to working muscles. Aerobic exercises stimulate the heart rate and breathing rate to increase in a way that can be sustained for the exercises session.

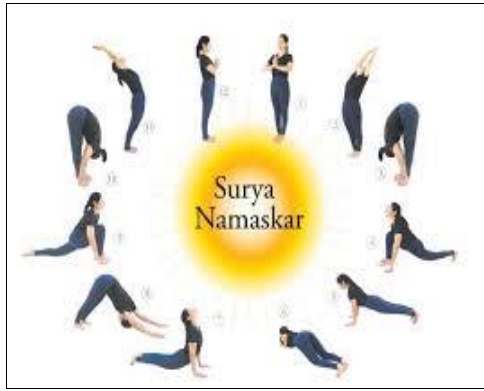
The word yoga derived from Sanskrit word ‘YUJ’ meaning to yoke, join or unite. This implies joining or integrating all aspects of the individual body with soul—to achieve a happy, balanced and useful life, and spiritually, uniting the individual with the supreme.

Exercise physiology is a scientific discipline that focuses on how an organism responds to exercise. Exercise represents one of the greatest stresses that an organism can encounter. Therefore, exercise represents an outstanding model for studying human and animal physiology. Most people are familiar with the study of exercise physiology as it relates to sports performance.



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Methodology

The purpose of investigator is to compare Resting Pulse Rate Performance of “Effect of Callisthenic Exercises, Aerobics and Yogasanas on Physiological Variables of Primary School Children’s”. The selected subjects were divided into three Experimental Groups and a Control Group with Twenty-Five subjects in each (n=25) Experimental Group-I underwent Callisthenic Exercises, (n=25) Experimental Group-II underwent Aerobics Exercises, (n=25) Experimental Group-III underwent Yogasanas and (n=25) Control Group-IV served as Control Group for the training period of Twenty-One (21) Weeks. Sample The Total Sample Consists 100 Girls and the Age Levels was 09 to 12 Years.

Independent Variables

Callisthenic Exercises

1. Arm rotation
2. Trunk forward bending and back

3. Trunk bending – Sideways: Left and Right

Aerobics Exercises

1. V-Step
2. L-Step
3. Zig-Zag Step

Yogasanas

Standing Asanas: Suryanamaskar, Garudasana.

Sitting Asanas: Padmasana, Paschimottanasana.

Supine Asanas: Matsysana, Naukasana.

Proline Asanas: Bhujangasana, Dhanurasana.

Dependent Variables

Physiological Variable

Sl. No	Variable	Tools	Measurement
1	Resting Pulse Rate	Swiss Made Stop Watch	Seconds

Analysis and interpretation of data

Table 1(a): Mean of pre-test and adjusted mean of post-test Resting Pulse Rate scores of Primary School Children in four Groups (Control, Callisthenic Exercise, Aerobics Exercise and Yogasana).

Groups	Pre-test Resting Pulse Rate		Post-test Resting Pulse Rate		
	Mean	SD	Mean	SD	Adjusted Mean
Control Group	89.44	4.53	87.92	4.18	88.15
Callisthenic Exercise Group	90.08	4.02	85.52	4.17	85.53
Aerobics Exercise Group	90.40	4.00	84.96	7.14	84.86
Yogasana Group	90.48	4.05	83.76	3.67	83.63

From the results of the above table represents the mean of pre-test and adjusted mean of post-test Resting Pulse Rate scores of Primary School Children in four Groups. The pre-test mean Resting Pulse Rate scores in Control Group is 89.44±4.53 as compared to 90.08±4.02 in Callisthenic Exercise Group; 90.40±4.00 in Aerobics Exercise Group and 90.48±4.05 in Yogasana Group. But mean post-test Resting Pulse Rate scores are higher in Aerobics Group (85.52±4.17) as compared to Aerobics Exercise Group (84.96±7.14) followed by Yogasana Group (84.96±7.14) and Control Group (87.92±4.18). The adjusted mean of post-test Resting

Pulse Rate scores of Primary School Children are presented in the above table.

Hypothesis: There is no significant difference between four groups (Control, Callisthenic Exercise, Aerobics Exercise and Yogasana) with respect to pre-test and post-test Resting Pulse Rate scores of Primary School Children.

To achieve this hypothesis, the Analysis of covariance (ANCOVA) (pre-test scores as covariate) technique has been applied and the results are presented in the following table.

Table 1(b): Comparison of between four groups (Control, Callisthenic Exercise, Aerobics Exercise and Yogasana) with respect to pre-test and post-test Resting Pulse Rate scores of Primary School Children by Analysis of covariance (ANCOVA).

Groups	Pre-test		Post-test		
	Mean	SD	Mean	SD	Adjusted Mean
Control Group	89.44	4.53	87.92	4.18	88.15
Callisthenic Exercise Group	90.08	4.02	85.52	4.17	85.53
Aerobics Exercise Group	90.40	4.00	84.96	7.14	84.86
Yogasana Group	90.48	4.05	83.76	3.67	83.63
F-test	0.3234 [@]		3.9246 [#]		
P-value	0.8084		0.0109 [*]		
Pair wise comparison of four groups by Tukeys multiple post hoc procedures					
Control vs Callisthenic exercise			p=0.9479		p=0.2945
Control Aerobics Exercise			p=0.8465		p=0.1357
Control vs Yogasana			p=0.8128		p=0.0148 [*]
Callisthenic Exercise vs Aerobics Exercise			p=0.9930		p=0.9762
Callisthenic Exercise vs Yogasana			p=0.9864		p=0.5668
Aerobics Exercise vs Yogasana			p=0.9999		p=0.8128

* $p < 0.05$, @one way ANOVA applied, # ANCOVA applied

The results of the above table clearly show the following:

- The four Groups (Control, Callisthenic Exercise, Aerobics Exercise and Yogasana) do not difference significantly with respect to pre-test Resting Pulse Rate scores of Primary School Children ($F=0.3234$, $p > 0.05$) at 5% level of significance. It means that, the pre-test Resting Pulse Rate scores of Primary School Children are similar in Control Group, Callisthenic Exercise Group, Aerobics Exercise Group and Yogasana Group.
- A four Groups (Control, Callisthenic Exercise, Aerobics Exercise and Yogasana) difference significantly with respect to post-test Resting Pulse Rate scores of Primary School Children ($F=3.9246$, $p < 0.05$) at 5% level of significance. Hence, the null hypothesis is rejected and alternative hypothesis is accepted. It means that, the post-test Resting Pulse Rate scores are different in four Groups (Control, Callisthenic Exercise, Aerobics Exercise and Yogasana). It means that, the post-test Resting Pulse Rate scores of Primary School Children are significantly higher in Callisthenic Exercise Group as compared to Aerobics Exercise Group and Yogasana Group followed by Control Group. Further, if F is significant, to know the pair wise comparisons of four groups (Control, Callisthenic Exercise, Aerobics Exercise and Yogasana) of Primary School Children by applying the Tukeys multiple post hoc procedures and the results are presented in the above table. It shows that,
- The Control Group and Callisthenic Exercise Group do not difference significantly with respect to post-test Resting Pulse Rate scores of Primary School Children ($p > 0.05$) at 5% level of significance. It means that, the post-test Resting Pulse Rate scores of Primary School Children are similar in Control Group and Callisthenic Exercise Group.
- The Control Group and Aerobics Exercise Group do not difference significantly with respect to post-test Resting Pulse Rate scores of Primary School Children ($p > 0.05$) at 5% level of significance. It means that, the post-test resting Pulse Rate scores of Primary School Children are similar in Control Group and Aerobics Exercise Group.
- The Control Group and Yogasana Group difference significantly with respect to post-test Resting Pulse Rate scores of Primary School Children ($p < 0.05$) at 5% level of significance. It means that, the post-test Resting Pulse Rate scores of Primary School Children are higher in

Yogasana Group as compared to Control Group.

- The Callisthenic Exercise Group and Aerobics Exercise Group do not difference significantly with respect to post-test Resting Pulse Rate scores of Primary School Children ($p > 0.05$) at 5% level of significance. It means that, the post-test Resting Pulse Rate scores of Primary School Children are similar in Aerobics Exercise Group and Callisthenic Exercise Group.
- The Callisthenic Exercise Group and Yogasana Group do not difference significantly with respect to post-test Resting Pulse Rate scores of Primary School Children ($p > 0.05$) at 5% level of significance. It means that, the post-test resting pulse rate scores of Primary School Children are similar in Callisthenic Exercise Group and Yogasana Group.
- The Aerobics Exercise Group and Yogasana Group do not difference significantly with respect to post-test Resting Pulse Rate scores of Primary School Children ($p > 0.05$) at 5% level of significance. It means that, the post-test Resting Pulse Rate scores are similar in Aerobics Exercise Group and Yogasana Group. The mean scores of pre-test and post-test Resting Pulse Rate scores of Primary School Children in four Groups (Control, Callisthenic Exercise, Aerobics Exercise and Yogasana) are also presented in the following figure.

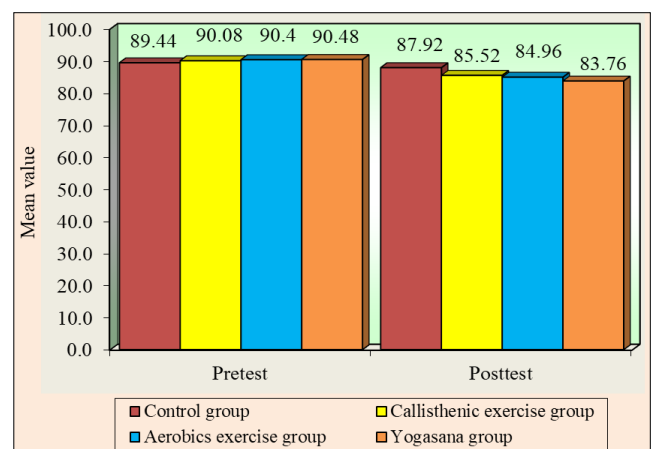


Fig 1: Comparison of four Groups with respect to pre-test and post-test Resting Pulse Rate scores of Primary School Children.

The above figure 1 Indicates that the Comparison of four Groups with respect to pre-test and post-test Resting Pulse Rate scores of Primary School Children.

Discussion on the Hypothesis

The Hypothesis was formulated on the reasoning that practices of Callisthenic, Aerobics and Yogasanas leads to increase the Physical and Physiological Fitness among the practitioners, because regular involvement in Callisthenic, Aerobics and Yogasanas activates develops Resting Pulse Rate in muscle and joints. Experimental and Control indicates the influence of Callisthenic, Aerobics and Yogasanas more on Control Group, in pre-test Mean was 89.44 and post-test mean 87.92, Experimental Callisthenic Exercises Group in pre-test Mean was 90.08 and post-test 85.52, Aerobics

Exercises Group pre-test Mean was 90.4 and post-test 84.96, and Yogasanas Group pre-test Mean was 90.48 and post-test 83.76. The Yogasanas Group has higher Resting Pulse Rate than by Callisthenic and Aerobics Group.

Hypothesis: There is no significant difference between pre-test and post-test Resting Pulse Rate scores of Primary School Children in four Groups (Control, Callisthenic Exercise, Aerobics Exercise and Yogasana).

To achieve this hypothesis, the paired t-test was applied and the results are presented in the following table.

Table 1(c): Comparison of pre-test and post-test Resting Pulse Rate scores of Primary School Children in four Groups (Control, Callisthenic Exercise, Aerobics Exercise and Yogasana).

Group	Test	Mean	Std. Dv.	Mean Diff	SD Diff	Paired t	P-value
Control Group	Pre-test	89.44	4.53	1.52	5.27	1.4425	0.1621
	Post-test	87.92	4.18				
Callisthenic Exercise Group	Pre-test	90.08	4.02	4.56	3.14	7.2684	0.0001*
	Post-test	85.52	4.17				
Aerobics Exercise Group	Pre-test	90.40	4.00	5.44	8.82	3.0830	0.0051*
	Post-test	84.96	7.14				
Yogasana Group	Pre-test	90.48	4.05	6.72	2.23	15.0868	0.0001*
	Post-test	83.76	3.67				

* $p < 0.05$

From the results of the above table, it can be seen that the following:

- There is no significant difference was observed between pre-test and post-test Resting Pulse Rate scores of Primary School Children in Control Group ($t=1.4425$, $p > 0.05$) at 5% level of significance. Hence, the null hypothesis is accepted and alternative hypothesis is rejected. It means that, the pre-test and post-test Resting Pulse Rate scores of Primary School Children in Control Group are similar.
- There is a significant difference was observed between pre-test and post-test Resting Pulse Rate scores of Primary School Children in Callisthenic Exercise Group ($t=7.2684$, $p < 0.05$) at 5% level of significance. Hence, the null hypothesis is rejected and alternative hypothesis is accepted. It means that, the post-test Resting Pulse Rate scores are significantly smaller as compared to pretest resting pulse rate scores of Primary School Children in Callisthenic Exercise Group.
- There is a significant difference was observed between pre-test and post-test Resting Pulse Rate scores of Primary School Children in Aerobics Exercise Group

($t=3.0830$, $p < 0.05$) at 5% level of significance. Hence, the null hypothesis is rejected and alternative hypothesis is accepted. It means that, the post-test Resting Pulse Rate scores are significantly smaller as compared to pre-test Resting Pulse Rate scores of Primary School Children in Aerobics Exercise Group.

- There is a significant difference was observed between pre-test and post-test Resting Pulse Rate scores of Primary School Children in Yogasana Group ($t=15.0868$, $p < 0.05$) at 5% level of significance. Hence, the null hypothesis is rejected and alternative hypothesis is accepted. It means that, the post-test Resting Pulse Rate scores are significantly smaller as compared to pre-test Resting Pulse Rate scores of Primary School Children in Yogasana Group.

Further, the effect size of each group after intervention programme was calculated by using Wilks Lambda and partial eta and the results are presented in the following table.

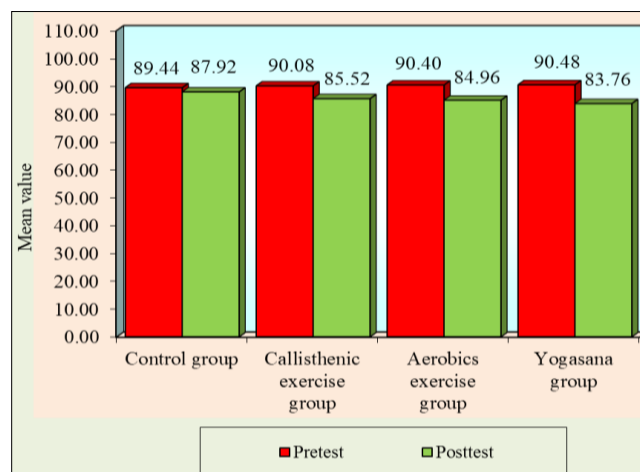


Fig 2: Comparison of Mean of pre-test and post-test Resting Pulse Rate scores of Primary School Children in Control, Callisthenic Exercise, Aerobics Exercise and Yogasana Group.

The above figure 2 Indicates that the Comparison of Mean of pre-test and post-test Resting Pulse Rate scores of Primary School Children in Control, Callisthenic Exercise, Aerobics Exercise and Yogasana Group.

Discussion on the Hypothesis

The Hypothesis was formulated on the reasoning that practices of Callisthenic, Aerobics and Yogasanas leads to increase the Physical and Physiological Fitness among the practitioners, because regular involvement in Callisthenic, Aerobics and Yogasanas activates develops Resting Pulse Rate in muscle and joints. Experimental and Control indicates the influence of Callisthenic, Aerobics and Yogasanas more on Control Group, in pre-test Mean was 89.44 and post-test mean 87.92, Experimental Callisthenic Exercises Group in pre-test Mean was 90.08 and post-test 85.52, Aerobics Exercises Group pre-test Mean was 90.4 and post-test 84.96, and Yogasanas Group pre-test Mean was 90.48 and post-test 83.76. The Yogasanas Group has higher Resting Pulse Rate than by Callisthenic and Aerobics Group.

Conclusions

The pre-test Resting Pulse Rate scores of Primary School Children are similar in Control Group, Callisthenic Exercise Group, Aerobics Exercise Group and Yogasana Group. The post post-test Resting Pulse Rate scores are different in four Groups (Control, Callisthenic Exercise, Aerobics Exercise and Yogasana). The post-test Resting Pulse Rate scores of Primary School Children are similar in Control Group and Callisthenic Exercise Group. The post-test Resting Pulse Rate scores are similar in Aerobics Exercise Group and Yogasana Group. The post-test Resting Pulse Rate scores are significantly smaller as compared to pre-test Resting Pulse Rate scores of Primary School Children in Yogasana Group.

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