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## Effect of an hour physical activity and Koga on cardiovascular endurance and resting heart rate among school children

**Ajayaghosh MV and Dr. V Mahadevan**

### Abstract

Physical activity is a vital thing in human life, but our new generation having a sedentary lifestyle, it makes lifestyle diseases in our children. The purpose of this study was to find out the effect of an hour Physical activity (combined, resistance and aerobic training) and Koga on cardiovascular endurance and resting heart rate among students. To accomplish the purpose of the study, forty-five overweight children had been chosen randomly from Chennai. The subjects' age ranged from 14 to 16 years. They had divided into three equal groups consists of 15 subjects each. Group-I had Given an hour of selected combined physical training, Group-II had given Koga Training, and Group-III was control which had not received any special pieces of exercise apart from the regular activities. The selected combined physical training and Koga training had selected as independent variables. Cardiovascular Endurance and Resting Heart Rate had chosen as dependent variables, and all dependent variables had measured by standardized test items as 1 mile run test and Heart rate monitor. Analysis of Covariance (ANCOVA) would be applied to find out the significant mean differences. In all the cases, the 0.05 level of confidence has fixed to test the hypothesis. Scheffe's post hoc test used to find out the mean difference on selected dependent variable among the groups. The results of the study exposed that the experimental groups had finished a significant difference in all the selected variables such as cardiovascular endurance and resting heart rate to compare the control group. Hence it was concluded that an hour Physical activity and Koga enhanced cardiovascular endurance and decreased resting heart rate among school children.

**Keywords:** Physical activity, Koga, cardiovascular endurance, resting heart rate

### Introduction

“Obesity is defined as abnormal or excessive fat accumulation that may impair health” (WHO). Obesity emanates from human's lifestyle, we consume vast numbers of calories but burn less, it creates more obese persons than earlier. Nowadays, people are more concerned about obesity than previous years. It is because of fear to get diseased. Now obesity itself branded as a disease. Subsequently, obesity has increased more than doubled globally from past years, especially the percentage of child obesity has increased. Globally the number of obese persons is growing rapidly. Obesity is one of the fastest growing public health problems. Obesity is avertable. But, it kills humans because of a sedentary lifestyle. It has been raised as one of the primary death cause worldwide. Obesity in children leads to the Metabolic Syndrome and ill health, and it increased the chance of hypertension, cardiovascular disease, altered glucose metabolism and irritable bowel syndrome.

“Physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure” (WHO). All are physically active except while sleeping, children have more energy than adults, but the new generation doesn't utilize it properly. Laziness, idleness, and lack of physical activity is the cause of lifestyle diseases among children. Regular physical activity helps to maintain mental health and physical health. It contributes to reducing the chance of depression among children and obesity.

Koga is a blend of kickboxing and yoga. It is a fusion workout with kickboxing movements, isometric movements, punches, and meditation. Koga developed in 2001 by Jon Koga (physical therapist from New York). Koga thinks about core and bodyweight strength training. Every Koga class is different, classes focus on lower body or use music with yoga or meditation. Koga generates “Koganetics” creating standing yoga postures into pulses to keep heart rate highly elevating.

The human being needs at least an hour physical activity to maintain his health and fitness for day-to-day operations. Poor diet and physical inactivity lead to physical and psychological diseases. World Health Organization recommends Children should do moderate- to vigorous-intensity physical activity for at least 60 minutes daily. Most of the physical activities are aerobic based not only aerobic exercise is not enough for children but also needs Vigorous-intensity activities at least three times per week, it develops musculoskeletal tissues, cardiovascular system, neuromuscular system, healthy body weight and mental health. Harvard School of Public Health has conducted a study about obesity and TV viewing among children. The results of the study show that lifestyle associated with childhood obesity and it increased the risk of cardiovascular disease, premature death, and type II diabetes. Children are more tend to sit in front of televisions than doing physical activities it leads to childhood obesity. Hence, the selected topic for the study was a timely study for the nation.

## 2. Definition of The Terms

### 2.1 Cardiovascular Endurance

It is the capability of the heart, blood cells and lungs to supply oxygenated blood to the working muscle tissues and continue exertion while receiving energy from the aerobic system used to deliver the body with energy. It is the system that kicks in third after the phosphagen and the glycogen-lactic acid system, and so the one that provides energy to the human circulatory system and the muscles over prolonged periods.

### 2.2 Resting Heart Rate

Resting heart rate is a number of your heart beats per minute while at complete rest. It will lower by way of your heart becomes stronger with aerobic exercise training. A low resting heart rate is an indicator of good fitness and your fitness level and full cardiovascular health.

## 3. Methodology

### 3.1 Subjects

For the current study, the investigator selected a total number of forty-five (N=45) overweight school boys had been chosen randomly from Chennai schools. The subjects' age ranged from 14 to 16 years. The subjects were voluntarily participated to conduct the study.

### 3.2 Orientation of the Subjects

The investigator made the meeting with the subjects and their parents. The aim of the study and the importance of the training were explained to the subjects understandably. All the subjects in the experimental groups were motivated to take part regularly for training, and the procedures for each test was explained clearly and demonstrated for a clear view. All the subjects were motivated to perform better during the test. The recording of measurements of each test item was made known to the subjects to familiarize them above their performance. All the subjects performed all test up to their maximum ability. The investigator has taken written permission from the parents of the boys to conduct the training programme.

### 3.3 Selection of variables and Tests

Physical activity and Koga training highly influenced by physical aspects. It had found from the literature that these variables might have a significant effect on Physical activity and Koga training. Hence, the investigator seriously got interested to know whether there was any significant enhancement or not in the following variables:

**Table I:** Selection of Tests

Variables	Test
Cardiovascular Endurance	1 mile run test
Resting Heart Rate	Heart rate monitor

### 3.4 Experimental design

The pre-test and post-test random group design used in the present study. The selected subjects randomly assigned to experimental and control groups of 15 each. Group-I had Given an hour of selected combined physical training, Group-II had given Koga Training, and Group-III was control which had not received any special pieces of exercise apart from the regular activities. The groups tested on selected criterion variables were cardiovascular endurance and resting heart rate before and immediately after the training programme.

### 3.5 Treatment

Throughout the training period, the experimental group-I selected combined physical training for three days per week (alternative days) for eight weeks. The workout lasted to 60 minutes/daily including warming up and warming down periods. The experimental group-II underwent Koga for three days per week (alternative days) for eight weeks. The workout lasted to 60 minutes/daily including warming up and warming down periods. Control group-III were instructed not to participate in any strenuous physical exercise and specific training throughout the training programme. However, they performed regular activities as per the curriculum.

The subjects underwent the particular programmes as per the schedules under the administration of the investigator. Each training sessions conducted only in the morning time. Before every training session, groups had a ten minutes dynamic warm-up exercise. All the boys involving in the training programmes questioned about their health throughout the training period, but none of them reported the injury. However, muscle soreness and fatigue reported in the early weeks, which diminished later.

## 4. Results and Discussion

The pre-test and post-test random group design used in the present study. The data collected from groups before and after completion of the training period on selected criterion variables. The selected variables were statistically examined for significant differences if any, by applying the analysis of covariance (ANCOVA). To find the significance.05 level of confidence fixed. Since three groups were involved, Scheffe's post hoc test used to determine

**Table I:** Analysis of Covariance on Cardiovascular Endurance of Physical Activity Koga and Control Group

	Combined Physical Training Group	Koga Training Group	Control Group	Source of Variance	Sum of Square	df	Mean Square	'F' ratio
Pre-test Mean	16.93	17.13	17.00	Between	0.31	2	0.156	0.26
S.D.	0.70	0.83	0.75	Within	24.66	42	0.587	
Post-test Mean	14.20	14.53	17.33	Between	88.84	2	44.42	28.49*
S.D.	1.61	1.12	0.89	Within	65.46	42	1.559	
Adjusted Post-test Mean	14.27	14.44	17.35	Between	89.82	2	44.91	37.55*
				Within	49.03	41	1.196	

\* Significant.05 level of confidence

(The table values required for significance at.05 level of confidence with df 2 and 42 and 2 and 41 were 3.22 and 3.33 respectively).

Table-I showed that the pre-test means values of cardiovascular endurance for combined physical training, Koga training group, and the control group was  $16.93 \pm 0.70$ ,  $17.13 \pm 0.83$  and  $17.00 \pm 0.75$  respectively. The obtained 'F' ratio value of 0.26 for pre-test scores of combined physical training, Koga training group, and the control group on cardiovascular endurance less than the required table value of 3.22 for significance with df 2 and 42 at.05 level of confidence.

The post-test means values for cardiovascular endurance for combined physical training, Koga training group, and the control group was  $14.20 \pm 1.61$ ,  $14.53 \pm 1.12$  and  $17.33 \pm 0.89$  respectively. The obtained 'F' ratio value of 28.49 for post-test scores of combined physical training, Koga training group, and the control group was greater than the required table value of 3.22 for the significance with df 2 and 42 at.05 level confidence.

The adjusted post-test means values of cardiovascular endurance for combined physical training, Koga training group, and the control group was 14.27, 14.44 and 17.35 respectively. The obtained 'F' ratio value of 37.55 for adjusted post-test scores of combined physical training, Koga training group, and the control group were greater than the

required table value of 3.33 for the significance with df 2 and 41 at.05 level of confidence. Hence, it was significant, and scheffe's post-hoc test used.

Table-II shows that the adjusted post-test mean difference in cardiovascular endurance between combined physical training and control groups and Koga group were 3.08, 2.91, respectively which are higher than the confidence interval value of 1.01 at 0.05 level of confidence. The adjusted post-test mean difference between physical training and Koga groups was 0.17 which was less than the confidence interval value of 1.01 at 0.05 level of confidence. It showed that there was no significant difference between physical training and Koga groups at 0.05 level of confidence.

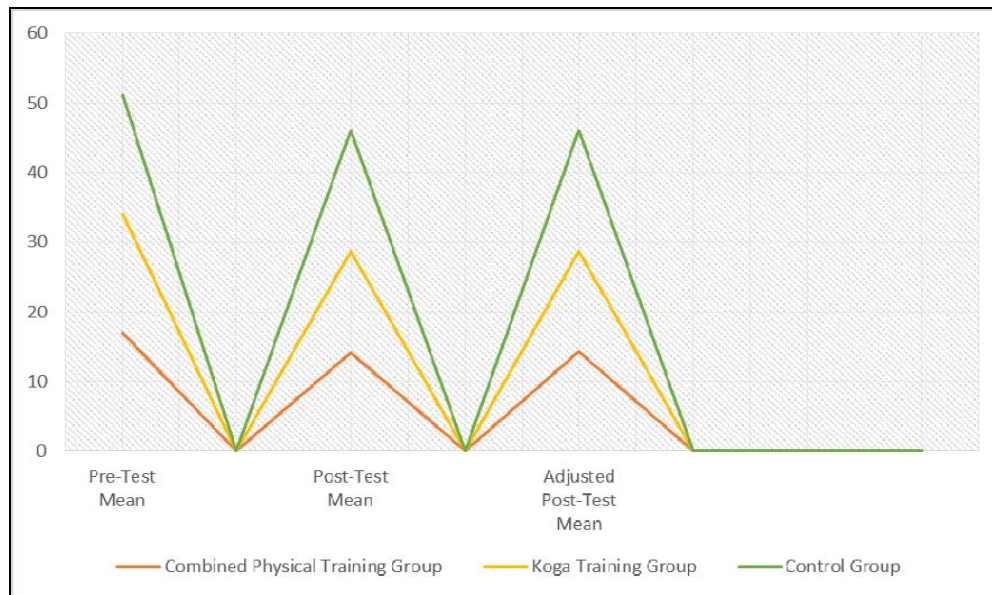
The outcomes of the study indicate that, both the experimental groups significantly changed when compared to control group. But the experimental groups were compared with each other and there been no significant difference. It has revealed that the experimental group namely, combined physical training group-I improved cardiovascular endurance when compared to control group and Koga training group-II.

The mean values of combined physical training, Koga training group, and the control group on cardiovascular endurance were graphically represented in Figure-I.

**Table II:** Scheffe's Post Hoc Test for the Differences between the Adjusted Post Paired Mean of Cardiovascular Endurance Adjusted post - test mean

Combined Physical Training Group	Koga Training	Control Group	Mean Deviation	Confidential Interval
14.27	14.44	-	0.17	1.01
14.27	-	17.35	3.08	
-	14.44	17.35	2.91	

\* Significant at 0.05 level



**Fig I:** Bar Diagram Showing the Mean Values of Physical Activity Koga and Control Group on Cardiovascular Endurance

**Table III:** Analysis of Covariance on Resting Heart Rate of Physical Activity Koga and Control Group

	Combined Physical Training Group	Koga Training Group	Control Group	Source of Variance	Sum of Square	df	Mean Square	'F' ratio
Pre-test Mean	83.80	83.73	83.93	Between	0.311	2	0.156	0.19
S.D.	3.02	2.65	2.91	Within	346.26	42	8.244	
Post-test Mean	81.40	81.60	83.60	Between	44.40	2	22.200	2.27*
S.D.	3.11	3.31	2.94	Within	410.80	42	9.781	
Adjusted Post-test Mean	81.42	81.68	83.49	Between	37.97	2	18.987	10.43*
				Within	74.59	41	1.819	

\* Significant.05 level of confidence

(The table values required for significance at.05 level of confidence with df 2 and 42 and 2 and 41 were 3.22 and 3.33 respectively).

Table-III showed that the pre-test means values of resting heart rate for combined physical training, Koga training group, and the control group was  $83.80 \pm 3.02$ ,  $83.73 \pm 2.65$  and  $83.93 \pm 2.91$  respectively. The obtained 'F' ratio value of 0.19 for pre-test scores of combined physical training, Koga training group, and the control group on resting heart rate less than the required table value of 3.22 for significance with df 2 and 42 at.05 level of confidence.

The post-test means values for resting heart rate for combined physical training, Koga training group, and the control group was  $81.40 \pm 3.11$ ,  $81.60 \pm 3.31$  and  $83.60 \pm 2.94$  respectively. The obtained 'F' ratio value of 2.27 for post-test scores of combined physical training, Koga training group, and the control group was less than the required table value of 3.22 for the significance with df 2 and 42 at.05 level confidence.

The adjusted post-test means values of resting heart rate for combined physical training, Koga training group, and the control group was 81.42, 81.68 and 83.49 respectively. The obtained 'F' ratio value of 10.43 for adjusted post-test scores of combined physical training, Koga training group, and the control group were greater than the required table value of 3.33 for the significance with df 2 and 41 at.05 level of

confidence. Hence, it was significant, and scheffe's post-hoc test used.

Table IV shows that the adjusted post-test mean difference in resting heart rate between combined physical training and control groups and Koga group were 2.07, 1.80, respectively which are higher than the confidence interval value of 1.25 at 0.05 level of confidence. The adjusted post-test mean difference between physical training and Koga groups was 0.27 which was less than the confidence interval value of 1.25 at 0.05 level of confidence. It showed that there was no significant difference between physical training and Koga groups at 0.05 level of confidence.

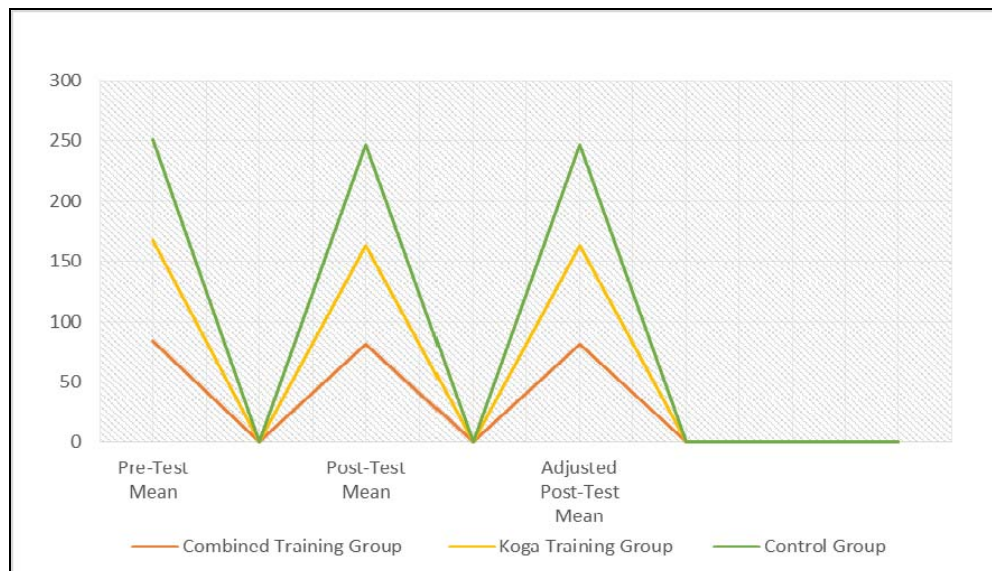
The outcomes of the study indicate that, both the experimental groups significantly changed when compared to control group. But the experimental groups were compared with each other and there been no significant difference. It has revealed that the experimental group namely, combined physical training group-I improved resting heart rate when compared to control group and Koga training group-II.

The mean values of combined physical training, Koga training group, and the control group on resting heart rate were graphically represented in Figure-II.

**Table IV:** Scheffe's Post Hoc Test for the Differences between the Adjusted Post Paired Mean of Resting Heart Rate Adjusted post - test mean

Combined Physical Training Group	Koga Training	Control Group	Mean Deviation	Confidential Interval
81.42	81.69	-	0.27	1.25
81.42	-	83.49	2.07	
-	81.69	83.49	1.80	

\* Significant at 0.05 level



**Fig II:** Bar Diagram Showing the Mean Values of Physical Activity Koga and Control Group on Resting Heart Rate

## 5. Conclusion

By results and findings, it has concluded that eight weeks Physical activity (combined, resistance and aerobic training) and Koga training improved cardiovascular endurance and resting heart rate among students. The results of the study provided the evidence that the combined physical training and Koga is an effective method for developing the physical fitness variables such as cardiovascular endurance and resting heart rate.

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