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Effect of Surynamaskar on cardiovascular fitness on school girls

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Abstract
The objectives of the study were to determine the effect of Surynamaskar on cardiovascular fitness and to compare effect of different pace of Suryanamaskar on cardiovascular fitness. Pretest-posttest group design was used for this study. Three groups were created, two experimental group and one control group. 15 girls were in each group in the age range of 16 – 18 years, out of 45 girls only 30 girls were able to complete total six weeks practices. First experimental group preformed Suryanamaskar with 2 minutes pace, second experimental group performed with 2 minute pace and third served as a control group. Total treatment duration was six weeks. Cardiovascular fitness was measured by AAHPERD 9 minute run/walk test before (pretest) and after (posttest) the treatment pried of all three groups. To determine the effect of Suryanamaskar on cardiovascular fitness on school girls analysis of covariance was used and level of significance was set at 0.05. In relation of cardiovascular fitness, a significant improvement ($P < 0.05$) was found in pace 2 group and no significant improvement found pace 4 and control group at the end of six weeks of practice.

Keywords: Suryanamaskar, Pace and cardiovascular fitness**.**

Introduction

Cardiovascular fitness is the ability to perform large muscles, whole body physical activity for relatively long period of time. It involves the functioning of the heart and lungs, the blood and its capillaries to carry oxygen, the blood vessels and capillaries supplying blood to all parts of the body and the muscles cells, which use the oxygen to provide the necessary for endurance exercise. (Miller, 2006) [11]. Activities such as aerobic dance, distance running, brisk walking, swimming, bicycling and cross country run are associated with cardiovascular fitness. The most important aspect of an exercises program is cardiorespiratory conditioning. There are many benefits of cardiovascular workout like increase physical work capacity at all ages, control all the problems associated with obesity, decrease the risk of coronary artery disease and stroke, decrease risk of diabetes and many more.

Suryanamaskar or sun salutation is a traditional Indian yogic practice, renders the benefits of stretching, static, and dynamic exercise. Each round of Suryanamaskar practice involves practicing 12 postures in succession with forward and backward bending along with deep exhalation and inhalation respectively to the maximum possible extent. Many people practice several rounds of Suryanamaskar for their regular physical fitness program.

Cardiovascular fitness is the core fitness component of physical fitness. The key method for improvement of cardiovascular is aerobic workout. There are plenty of studies have been done and found that regular practices of asanas with moderate pace, benefited as an aerobic activity. Suryanamaskar is itself combination of six asanas. (Shankar and Pancholi, 2011) [1, 6]. Going through many research papers this query has been raised that will change in the pace of Suryanamaskar improve cardiovascular fitness. (Bhavanani, 2011) [2].

The objectives of the study were to determine the effect of Surynamaskar on cardiovascular fitness and to compare effect of different paces of Suryanamaskar on cardiovascular fitness.

Methods

Subjects: The subjects for this study were selected from the KIDDY'S CORNER SCHOOL, Gwalior. Forty five girls in the age range of 16 – 18 years from class 11th and 12th were selected randomly for this study.

Variables: Suryanamaskar was considered as independent variable and cardiovascular fitness was considered as dependent variable.

Test for cardiovascular fitness

AAHPERD 9 minute run/walk used, test was conducted in a standard track. The first lane of the track marked at regular interval of 20 meters. The subjects were asked to stand just behind the starting line and with the command "set, go", they started running /walking and it will be continued up to 9 minutes. A warning was given at 8th minute, so that subjects can cover maximum distance as much as possible in a last minute and final signal was given at 9th minute and subject stopped respectively on their final spot. The distance covered was measured in meters. For score the distance covered by each subject was recorded to the nearest 10 meters (Miller, 2006) [11].

Experimental design

Pretest-posttest group design was used for this study. Three groups were created, two experimental group and one control group. 15 girls were in each group. First experimental group preformed Suryanamaskar with 2 minutes pace, second experimental group performed with 4 minutes pace and third served as a control group. Total treatment duration was six weeks. Cardiovascular fitness was measured by AAHPERD 9 minute run/walk test before (pretest) and after (posttest) the treatment of all three groups.

All participants were briefed introduced about general objectives and requirement of Suryanamaskar. Suryanamaskar training was carried for a period of six weeks, five days per week. The scheduled time of practice was during their physical education period for 30-35 minutes. Each day of the first week, Suryanamaskar practice was demonstrated to the group by the research scholar and most important points were reviewed several times. The pace of Suryanamaskar was control by watch. In two minutes pace of suryanamaskar each round took around 10 seconds. Similarly in four minutes pace of suryanamaskar each step took around 20 seconds. To determine the effect of Suryanamaskar on cardiovascular fitness on school girls' analysis of covariance was used and level of significance was set at 0.05. Practice of suryanamaskar was performed according book asana pranayama mudra banndha (Bhihar School of yoga). 12 steps of suryanamaskar are following.

Steps	Asana	Pace 2 (Time in seconds)	Pace 4 (Time in seconds)
1 & 12	Pranamasana	10 + 10 = 20	20 + 20 = 40
2 & 11	Hasta utthanasana	10 + 10 = 20	20 + 20 = 40
3 & 10	Padahastasana	10 + 10 = 20	20 + 20 = 40
4 & 9	Ashwa sanchalanasana	10 + 10 = 20	20 + 20 = 40
5 & 8	Parvatasana	10 + 10 = 20	20 + 20 = 40
6	Ashtanga namaskara	10	20
7	Bhujangasana	10	20
Total = 120 seconds			Total = 240 seconds

Results

The values of the means (unadjusted) and standard deviation for the data of cardiovascular fitness in different groups during post-test are show in table 1.

Table 1: Descriptive Statistics

Groups	Mean	Std. Deviation	N
Pace 2	1126.0	50.81	10
Pace 4	1014.0	114.71	10
Control	1000.0	121.83	10
Total	1046.6	113.05	30

Adjusted means for data on cardiovascular fitness of different groups during post-test shows in table 2.

Table 2: Adjusted Post Means

Groups	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Pace 2	1109.0	24.69	1058.28	1159.78
Pace 4	1020.5	24.44	970.28	1070.76
Control	1010.4	24.51	960.05	1060.82

In table 3 shows that the f-value for the adjusted of three groups during post-test. Since p-value of groups is less than 0.05, which indicate that there is significant difference in adjusted means of cardiovascular fitness between three groups.

Table 3: Tests of Between-Subjects Effects

Source	Type I Sum of Squares	Df	Mean Square	F	p-value
Pre	159083.47	1	159083.47	26.72	.000
Groups	56786.40	2	28393.20	4.76	.017
Error	154796.78	26	5953.72		
Total	33236000.00	30			
Corrected Total	370666.66	29			

Since, the analysis of covariance for cardiovascular scores was found significant difference among groups. Therefore post hoc comparison LSD test was applied and is presented in table number 5.

Table 4: Post Hoc Test (LSD)

Group	Group	Mean difference	p-value
Pace 2	Pace 4	88.509*	0.018
	Control	98.594*	0.009
Pace 4	Control	10.085	0.772

Table 4 indicates that there is a significant difference found between pace 2 and pace 4 (p = 0.018) as the p-value is less than 0.05. There is also significant difference found between pace 2 and control group (p = 0.009) as the p-value is less than 0.05. There is no significant difference found between pace 4 and control group (p = 0.77) is greater than 0.05.

Discussion

The objectives of the study were to determine the effect of surynamaskar on cardiovascular fitness and to compare effect of different pace of Suryanamaskar on cardiovascular fitness. The finding of study revealed that there was a significant improvement found in cardiovascular fitness due to regular practice of suryanamaskar in pace 2 group and other side there is no significant improvement found in pace 4 and control group, but pace 4 group is higher side as compare control group. The finding is in agreement with the results of (Bhavanani, 2011) [2].

Cardio respiratory fitness indicates a high state of efficiency of the circulatory and respiratory systems in supplying oxygen to the working muscles (miller). Basically the key method for improvement in cardiovascular fitness is low intensity activities for long duration (aerobic actives). Aerobic actives improve aerobic metabolism which improve efficiency of circulatory and respiratory systems. Same way practices of Suryanamaskar with low intensity (pace 2 and pace 4) for 30

to 35 minutes help to improve aerobic metabolism, which might be the cause of improvement in cardiovascular fitness. There was significant difference found between pace 2 and control group as well as between pace 2 group and pace 4 group and there were no significant difference found between pace 4 pace and control group. When we compare both paces than we found that pace 2 adjusted post mean is 1109.03 which is greater than pace 4 adjusted post mean 1020.52 this indicated that cardiovascular fitness improved more in pace 2 as compare pace 4. In this way present study confirmed that practice of suryanamaskar for six weeks are sufficient to bring out significant improvement on cardiovascular fitness with pace 2.

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