EFFECT OF SURYANAMASKAR ON BLOOD PRESSURE OF SCHOOL GIRLS

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ABSTRACT

The objectives of the study were to determine the main effect of training durations (within-groups), the main effect of groups (between-groups) and interaction effect (combined effect of training durations and groups) on blood pressure due to practices of Suryanamaskar. Mixed design was used for the study. Three groups were created (pace 1, pace 2 and pace 4 groups). ten girls were in each group in the range of 15 – 17 years. First experimental group performed one round of Suryanamaskar in 1 minute pace, second experimental group in 2 minutes and third experimental group in 4 minutes. Total treatment duration was six weeks. Blood pressure was measured by Digital Blood Pressure Monitor in mmHg before (pretest), after 3 weeks and after 6 weeks of all three groups. 3 x 3 mixed factorial ANOVA was used and level of significance was set at 0.05. The findings of the study revealed that practice of Suryanamaskar for 3 weeks and 6 weeks are not sufficient to bring out significant improvement on blood pressure (main effect of training duration). There was no interaction effect as in all three groups. There was no significant difference found among three groups (main effect of groups) on blood pressure at pretest, after 3 weeks and after 6 weeks.

Key words: *Suryanamaskar, Pace, Blood Pressure and Mixed ANOVA.*

INTRODUCTION:

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.

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 cardiovascular conditioning. There are many benefits of cardiovascular workout like increase physical work capacity at all ages, control blood pressure, control all the

problems associated with obesity, decrease the risk of coronary artery disease and stroke, decrease risk of diabetes and many more.

Cardiovascular fitness is the core fitness component of physical fitness. There is a positive high correlation between blood pressure and cardiovascular fitness. If an individual has good cardiovascular fitness than naturally blood pressure would be normal. The key method for improvement of cardiovascular fitness is aerobic workout. There are plenty of studies have been done and found that regular practices of asanas with moderate pace, benefited as a aerobic activity. Suryanamaskar is itself combination of six asanas. (Shankar and Pancholi, 2011). Going through many research papers this query has been raised that change in the pace of Suryanamaskar will effect on blood pressure (Bhavanani, 2011).
The objectives of the study were following:

- To determine the effect of different paces (between-groups) of Surynamaskar on blood pressure.
- To determine the effect different training durations (within-groups) on different paces of Suryanamaskar on blood pressure.
- To investigate whether there is interaction effect (combined effect of groups and training durations) on blood pressure due to practice of Suryanamaskar.

METHODS:

Subjects:

The subjects for this study were selected from the KIDDY'S CORNER SCHOOL, Gwalior. Thirty six girls in the range of 15 – 17 years from class 11^{th} and 12^{th} were selected randomly for this study. Only thirty girls were able to complete 6 weeks Suryanamaskar practices.

Variables:

Suryanamaskar was considered as independent variable and blood pressure was considered as dependent variable.

Test for blood pressure:

Static balance was measured by Digital Blood Pressure Monitor. Subject was instructed to wear a short sleeved T-shirt or loose fitting clothing so that the sleeve can be rolled up comfortably. Subjects were given the rest for five minutes before taking readings. Subject was sitting down in

a quiet place, with their arm resting on a firm surface. The deflated cuff was rolled on right upper arm of the subjects. It is very important that their arm will be supported so that the cuff around the arm is at the same level as their heart. The arm was totally relaxed and not tensed. The deflated cuff needs to be tight, but not too tight. We should be able to insert two fingers between it and the skin. Then the blood pressure recorded in the Digital blood pressure monitor. Three readings were taken each about two minutes apart. Final scores was an average of all the three readings. The reading on the display was record in mmHg.

Experimental design:

Mixed-Model design (between-within group design) was used for the study. The experimental treatment was assigned randomly into three groups. Ten girls were in each group. The data was collected from all the three groups before the training (pre-test), after 3 weeks and after 6 weeks training of Suryanamaskar. First experimental group preformed one round of Suryanamaskar in 1 minute pace, second experimental group performed in 2 minutes pace, third experimental group performed in 4 minutes. Total treatment duration was six weeks.

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 40-45 minutes. Suryanamaskar practice was demonstrated to the group by the scholar and most important points were reviewed several times. The pace of Suryanamaskar was control by watch. To determine the effect different paces of Suryanamaskar on blood pressure on school girls 3 x 3 between-within factorial ANOVA was applied and level of significant was set at 0.05.

RESULTS:

Table 1: Descriptive Statistics of Systolic Blood Pressure of different groups and training durations of Suryanamaskar.

	Groups	Mean	Std. Deviation	N
Pretest	pace1	119.80	2.44	10
	pace2	120.50	2.27	10
	pace4	119.40	3.62	10
	Total	119.90	2.78	30
3 weeks	pace1	120.50	3.20	10
	pace2	119.30	3.16	10
	pace4	119.90	2.46	10
	Total	119.90	2.90	30
6 weeks	pace1	119.70	4.02	10

pace2	119.10	3.84	10
pace4	119.20	3.48	10
Total	119.33	3.67	30

In table 2 Mauchly's test was applied to check the assumption of sphericity. The p-value is 0.95 which is more than 0.05, so we found that the assumption of sphericity was fulfilled.

Table 2: Mauchly's Test of Sphericity for Training Duration of Systolic Blood Pressure

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	p-value	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Durations	.996	.094	2	.954	.996	1.000	.500

Table 3: F- Table for Training Durations (Within-Subjects Effects) and Interaction Systolic Blood Pressure

Source		Type III Sum of Squares	Df	Mean Square	F	p-value
Duration	Sphericity Assumed	6.422	2	3.211	.338	.715
Durations*groups	Sphericity Assumed	11.444	4	2.861	.301	.876
Error(duration)	Sphericity Assumed	512.800	54	9.496		

Above table shows that there was no significant main effect of training durations on systolic blood presser as the p-value was 0.71 which is greater than 0.05. It also shows that there was no significant interaction effect between groups and training durations as the p-value was 0.876 which is greater than 0.05.

Table 4: F- Table for Groups (Between-Subjects Effects) of Systolic Blood Pressure

Source	Type III Sum of Squares	Df	Mean Square	F	p-value
Intercept	1289767.511	1	1289767.51	104953.95	.000
Groups	4.022	2	2.011	.164	.850
Error	331.800	27	12.289		

Above table shows that there was no significant main effect of groups (pace 1, pace2 and pace 4) on systolic blood presser due to Suryanamaskar practice as the p-value was 0.85 which is greater than 0.05.

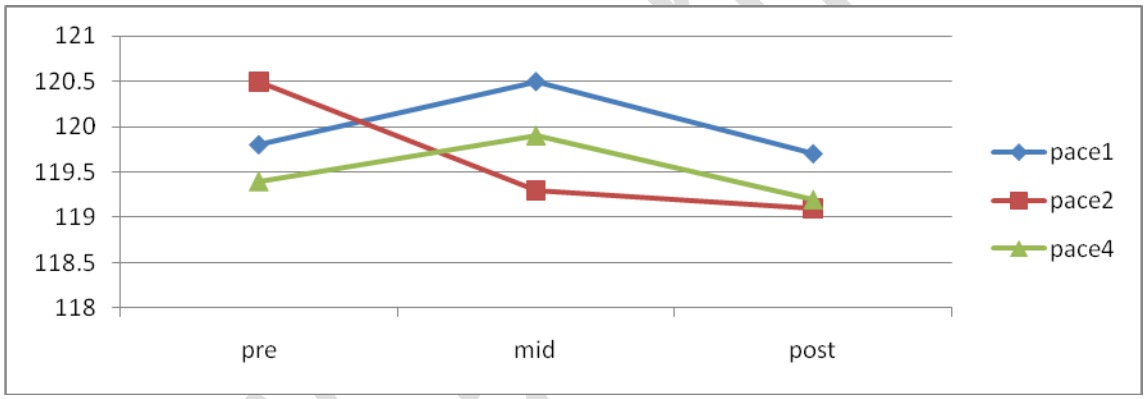

Figure 1: Graphical representation of different groups with time intervals of Systolic Blood Presser

On the basis of above tables we concluded that practice of Suryanamaskar for 12 weeks are not sufficient to bring out significant effect on systolic blood presser.

Table 5: Descriptive Statistics of Diastolic Blood Pressure of different groups and training durations of Suryanamaskar.

	Groups	Mean	Std. Deviation	N
Pretest	pace1	78.20	3.91	10
	pace2	79.10	4.84	10
	pace4	78.40	3.30	10
	Total	78.56	3.94	30
3 weeks	pace1	79.10	5.64	10
	pace2	79.40	5.48	10
	pace4	79.80	4.28	10
	Total	79.43	5.00	30
6 weeks	pace1	79.90	4.28	10
	pace2	78.00	4.87	10
	pace4	78.80	5.28	10
	Total	78.90	4.72	30

In table 6 Mauchly's test was applied to check the assumption of sphericity. The p-value is 0.12 which is more than 0.05, so we found that the assumption of sphericity was fulfilled.

Table 6: Mauchly's Test of Sphericity for Training Duration of Diastolic Blood Pressure

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	Df	p-value	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Duration	.853	4.129	2	.127	.872	.996	.500

Table 7: F- Table for Training Durations (Within-Subjects Effects) and Interaction Diastolic Blood Pressure

Source		Type III Sum of Squares	Df	Mean Square	F	p-value
Duration	Sphericity Assumed	11.467	2	5.733	.244	.784
Duration*groups	Sphericity Assumed	24.267	4	6.067	.258	.903
Error(duration)	Sphericity Assumed	1268.267	54	23.486		

Above table shows that there was no significant main effect of training durations on diastolic blood pressure as the p-value was 0.78 which is greater than 0.05. It also shows that there was no significant interaction effect between groups and training durations as the p-value was 0.90 which is greater than 0.05.

Table 8: F- Table for Groups (Between-Subjects Effects) of Diastolic Blood Pressure

Source	Type III Sum of Squares	Df	Mean Square	F	p-value
Intercept	561216.100	1	561216.100	28480.98	.000
Groups	.867	2	.433	.022	.978
Error	532.033	27	19.705		

Above table shows that there was no significant main effect of groups (pace 1, pace2 and pace 4) on diastolic blood pressure due to Suryanamaskar practice as the p-value was 0.97 which is greater than 0.05.

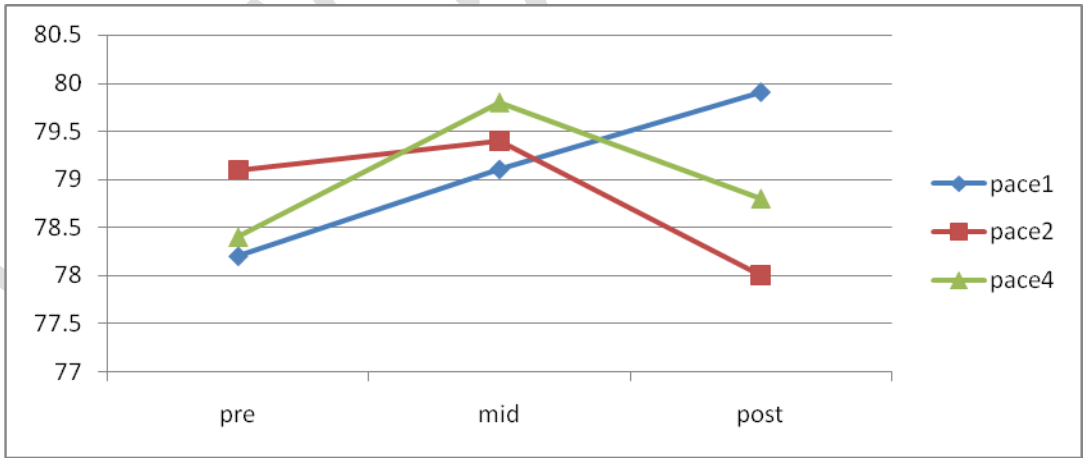

Figure 2: Graphical representation of different groups with time intervals of Diastolic Blood Presser

On the basis of above tables we concluded that the practices of Suryanamaskar for 12 weeks are not sufficient to bring out significant effect on diastolic blood presser.

DISCUSSION:

The objectives of the study were to determine the main effect of training durations (within-groups), the main effect of groups (between-groups) and interaction effect (training durations x groups) on blood pressure due to practices of Suryanamaskar. The finding of the study revealed that practice of Suryanamaskar for 3 weeks and 6 weeks are not sufficient to bring out significant improvement on blood pressure (main effect of training duration). There is no significant difference found among three groups (main effect of groups) on blood pressure at pretest, after 3 weeks and after 6 weeks. There is no significant interaction effect found between training duration and groups due to practice of Suryanamaskar.

Study concluded that Suryanamaskar practice for six weeks with different paces is not sufficient to bring significant change on blood pressure of school girls. The normal range of blood presser is 120/80 mmHg. We can say that all groups had around normal range of blood pressure in the starting of the Suryanamaskar practice. This may be the reason that there is no significant effect found of Suryanamaskar practice on blood presser. The finding is in agreement with the results of (Harinath et al., 2004).

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