An Intervention On Surya Namaskar; A Pilot Study

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Abstract: Objective of the study is to find out the effect of repetitions of one-minute surya namaskar for two weeks on selected variables viz; Vo2 Max, Strength Endurance and Flexibility.
Procedure and Methodology: Thirty male subjects (students) age ranging from 14 to 17 students were randomly selected for the purpose of the study. Vo2 Max, Strength Endurance and Flexibility were selected as the dependent variable. The pre-test and post-test randomized group design was used. The subjects were randomly divided into two groups i.e. experimental (15 nos) and control group (15 nos). Experimental group were given Yoga Intervention of one minute pace of surya namaskar for three weeks (for three times a week) and control group as continuing regular activities. All the subjects were tested prior and after three weeks of surya namaskar training with one minute on selected variables viz., Vo2 Max, Strength Endurance and Flexibility. The descriptive statistics such as mean, median, mode, standard deviation, maximum and minimum was used and to find out the significant difference of the means between experimental group and control group (pre-test and post-test) the Analysis of Covariance (ANCOVA) was employed at .05 level of significance.
Results: The adjusted mean of experimental and control group for VO2 Max, Strength Endurance and Flexibility is 41.63 and 41.64 ml/kg/min, 49.65 and 46.81 count per minute, and 15.99 and 14.68 inches respectively. And lower bound and upper bound of experimental (treatment group with 1 minute) and control group for VO2 Max, Strength Endurance and Flexibility were 38.73 & 44.52 and 38.75 & 44.53 ml/kg/min, 48.38 & 50.93 and 45.54 & 48.09, and 15.40 & 16.58 and 14.09 & 15.26 respectively. The ANCOVA results shows that the significant difference does not exist on VO2 Max as the calculated value (.995) is greater than .05, which indicate that, there is no significant improvement exist after two weeks of surya namaskar training with the intensity of one minute on VO2 Max. And significant differences exist on Strength Endurance and Flexibility as the calculated p values (.003 and .004) is lesser than .05, which indicate that there is significant improvement exist after three weeks of surya namaskar training with the intensity of one minute on strength endurance and flexibility. **Conclusion**: One-minute repetitions of surya namaskar training can bring significant improvement on strength endurance and flexibility.

Key words: Surya Namaskar, Vo2 Max, Strength Endurance, Flexibility, Experimental Group, Control Group.

Introduction:
Sports being a competitive in nature always gives stress to the athletes whenever the results is positive or negative, it gives the same results as comparison to negative or positive. But the learning always takes place to the athletes. Like if lost they learnt not to defeat and if won also, they learnt not to lost and maintain the performance at the top. So, to reduces the stresses and anxiety, athletes trained to have those physical fitness or motor fitness components throughout the year round of training to maintain and the improvement of the performance. Every sport has specific demands in terms of physical and physiological characteristics. There is always a positive transfer of learning. Flexibility as always, the most important fitness components to prevent athletes from possible sports injuries. Strength and endurance have been always the predictive variables in elite level of performance. Repetition in a monotonous type of training feel bored to the athletes and a plateau comes on the performance of the athletes. By engaging to the different activities of different sports athletes got refresh and motivated which lead to improve the physical and physiological variables related with the engaged activities or recreational activities. Yoga as the most common exercises for all can increase the physical fitness components of students as well as the normal sedentary people. Pal, et al., (2024) stated that “surya namaskar training for five days a week for six weeks can enhance physical, physiological, and body composition with reduction to the prevention of lifestyle-related cardiovascular diseases”. So, the purpose of present study is to find out the effect of one-minute surya namaskar on selected physical and physiological variables i.e., vo2 max, strength endurance and flexibility among the school children.

Methodology: Thirty male subjects (students) age ranging from 14 to 17 students were randomly selected for the purpose of the study. Vo2 Max, Strength Endurance and Flexibility were selected as the dependent variable. The pre-test and post-test randomized group design was used. The subjects were randomly divided into two groups i.e. experimental (15 nos) and control group (15 nos). Experimental group were given Yoga Intervention of one minute pace of surya namaskar for two weeks for three time a week and control group as continuing regular activities. All the subjects were tested prior and after two weeks of surya namaskar training with one minute on selected variables viz., Vo2 Max, Strength Endurance and Flexibility. The descriptive statistics such as mean, median, mode, standard deviation, maximum and minimum was used and to find out the significant difference of the means between experimental group and control group (pre-test and post-test) the Analysis of Covariance (ANCOVA) was employed at .05 level of significance.

Results:

Table 1: Descriptive statistics of experimental and control group on selected variables

Variables	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
VO2 Max	Experimental Group	41.63[a]	1.41	38.73	44.52
	Control Group	41.64[a]	1.41	38.75	44.53
Strength Endurance	Experimental Group	49.65[a]	.62	48.38	50.93
	Control Group	46.81[a]	.62	45.54	48.09
Flexibility	Experimental Group	15.99[a]	.29	15.40	16.58
	Control Group	14.68[a]	.29	14.09	15.26

a. Covariates appearing in the model are evaluated at the following values: VO2 Max Pre, Strength Endurance Pre, and Flexibility Pre = 34.80, 45.27, and 13.50.

The adjusted mean of experimental and control group for VO2 Max, Strength Endurance and Flexibility is 41.63 and 41.64 ml/kg/min, 49.65 and 46.81 count per minute, and 15.99 and 14.68 inches respectively. And lower bound and upper bound of experimental (treatment group with 1 minute) and control group for VO2 Max, Strength Endurance and Flexibility were 38.73 & 44.52 and 38.75 & 44.53 ml/kg/min, 48.38 & 50.93 and 45.54 & 48.09, and 15.40 & 16.58 and 14.09 & 15.26 respectively.

Table 2: Mean comparison between experimental and control group by applying ANCOVA on selected variables

Variables	Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
VO2 Max	Vo2 Max Pre	120.92	1	120.92	4.28	.048	.14
	Group	0.00	1	0.00	0.00	.995	.00
	Error	763.62	27	28.28			
	Total	52893.59	30				
	Corrected Total	897.72	29				
Strength Endurance	Strength Endurance Pre	2256.61	1	2256.61	389.43	.000	.94
	Group	60.12	1	60.12	10.37	.003	.28
	Error	156.46	27	5.79			
	Total	72339.00	30				
	Corrected Total	2545.37	29				
Flexibility	Flexibility Pre	20.10	1	20.10	16.99	.000	.39
	Group	12.02	1	12.02	10.16	.004	.27
	Error	31.94	27	1.18			
	Total	7111.00	30				
	Corrected Total	57.67	29				

a. R Squared for VO2 Max, Strength Endurance, and Flexibility = .149 (Adjusted R Squared = .086), a. R Squared = .939 (Adjusted R Squared = .934), and a. R Squared = .446 (Adjusted R Squared = .405).

The ANCOVA table shows that the significant difference does not exist on VO2 Max as the calculated value (.995) is greater than .05, which indicate that, there is no significant improvement exist after two weeks of surya namaskar training with the intensity of one minute on VO2 Max. And significant differences exist on Strength Endurance and Flexibility as the calculated p values (.003 and .004) is lesser than .05, which indicate that

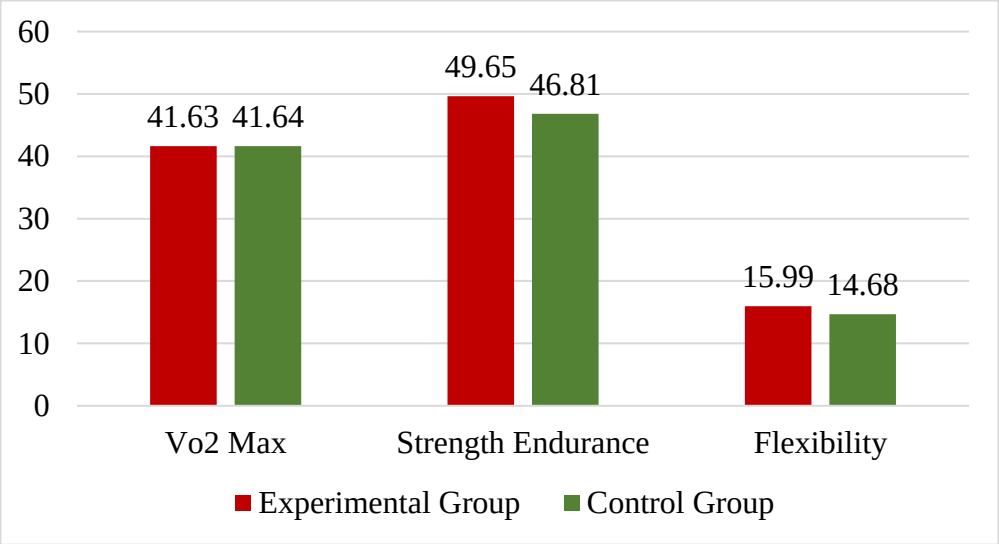
there is significant improvement exist after two weeks of surya namaskar training with the intensity of one minute on strength endurance and flexibility.

Table 3: Pairwise comparison between experimental and control group on selected variables

Variables	(I) Group		Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
VO2 Max	Experimental Group	Control Group	-.01*	2.04	.995	-4.20	4.18
	Control Group	Experimental Group	.01	2.04	.995	-4.18	4.20
Strength Endurance	Experimental Group	Control Group	2.84*	.88	.003	1.03	4.65
	Control Group	Experimental Group	-2.84	.88	.003	-4.65	-1.03
Flexibility	Experimental Group	Control Group	1.31*	.41	.004	.47	2.16
	Control Group	Experimental Group	-1.31	.41	.004	-2.16	-.47

Based on estimated marginal means
a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Figure 1: Mean Comparison Chart of Experimental and Control Group on selected variables



Discussion of Finding: Many studies have been done and stated that yoga can improve physical fitness. A study by Suwannakul, et al., (2024) stated that "Surya Namaskar yoga is a useful exercise for maintaining weight and enhancing physical fitness of college students". Combination of surya namaskar and yogic exercises are more effective for physical, physiological and psychological abilities (Jaiganesh, et al., 2022). Yogic interventions can reduce fear, anxiety and enhanced emotional stability (Lamba, et al., 2023). Study by Waghmare, M. J. (2024) and Balaji, et al., (2024) stated that "surya namaskar intervention for six days a week for three months shows significant improvement on flexibility and abdominal muscle strength". Sarkar, D., (2013) and Mody, B. S. (2011) also stated flexibility (sit and reach) and cardiovascular endurance (12 min Cooper Test) can improve after six times a week for six weeks of surya namaskar exercise. But the present study shows the insignificant improvement on endurance this may be because of the repetition for the exercise in a week and the duration of the training was not enough to bring the significant improvement to the students. And the significant improvement exists after three weeks of surya namaskar training on strength endurance and flexibility, which revealed that the three weeks of surya namaskar for three times a week can bring significant improvement to the students. The present study is also supported by the study of Dubey, S., & Choudhary, P. K. (2024).

Conclusion: One-minute repetitions of surya namaskar training can bring significant improvement on strength endurance and flexibility of the school going students.

References:

1. Balaji, E., Murugavel, K., Rajkumar, M., Logeswaran, S., Vijayasankar, V., & Devaraj, C. (2024). The Effect of a Six-Week Course of Surya Namaskar Practice on Back Flexibility and Lumbar Flexion in Male College Students. Physical Education Theory and Methodology, 24(1), 41-46. DOI: https://doi.org/10.17309/tmfv.2024.1.05.
2. Bandyopadhyay, A., Halder, K., Pathak, A., Kumar, B., & Saha, M. (2022). Surya namaskar: as an alternative for aerobic fitness. International Journal of Yoga, 15(2), 163-167. DOI: 10.4103/ijoy.ijoy_8_22.
3. Dubey, S., & Choudhary, P. K. (2024). Analyzing the Musculoskeletal Flexibility in Young Females: The Impact of a Six-Week Surya Namaskar Intervention on Back Flexibility and Lumbar Flexion. Physical Education Theory and Methodology, 24(4), 554-561. DOI: https://doi.org/10.17309/tmfv.2024.4.06.
4. Jaiganesh, D. K., Parthasarathy, D. S., & Duraisamy, M., (2022). Effect of Suryanamaskar Practices with and Without Yoga Nidra on Stress Among High School Students-A Randomized Controlled Trial. Int. J. Life Sci. Pharma Res, 12(6), L28-33. 10.22376/ijpbs/lpr.2022.12.6.SP25.L28-33.
5. Lamba, P., Dwivedi, D., Mann, N., Kaur, H., Chamola, S. K., Chaudhary, P., & Kaur, N. (2023). Effect of Surya Namaskar on Autonomic Status and Serum Cortisol Levels in Male Medical Students: A Longitudinal Study. Journal of Clinical & Diagnostic Research, 17(11). DOI: 10.7860/JCDR/2023/65388.18746.
6. Mody, B. S. (2011). Acute effects of Surya Namaskar on the cardiovascular & metabolic system. Journal of bodywork and movement therapies, 15(3), 343-347. https://doi.org/10.1016/j.jbmt.2010.05.001.
7. Pal, R., Rao, S., Deo, G., Basavaraddi, I. V., Sharma, N., & Madaan, L. (2024). Impacts of the Surya Namaskar on Body Composition and Physiological Parameters among Yoga and Non Yoga Professionals: A Quasi-experimental Study. Journal of Clinical & Diagnostic Research, 18(2). DOI:10.7860/JCDR/2024/66733.19043
8. Sarkar, D. (2013). Effect of Surya namaskar on selected physical fitness variables of physical education students. Journal of Physiology and Pharmacology, 57(2), 169-176. https://doi.org/10.22271/kheljournal.2022.v9.i1g.2412.
9. Srivastav, A., & Kar, S. (2024). Effect of Suryanamaskar Practice on Selected Physical Fitness Variables of College Students. Indian Journal of YOGA Exercise & Sport Science and Physical Education, 45-50. DOI: https://doi.org/10.58914/ijyesspe.2024-9.Spl.8
10. Suwannakul, B., Sangkarit, N., Thammachai, A., & Tapanya, W. (2024). Effects of Surya Namaskar yoga on perceived stress, anthropometric parameters, and physical fitness in overweight and obese female university students: A randomized controlled trial. Hong Kong Physiotherapy Journal, 1-11. https://doi.org/10.1142/S1013702525500027.
11. Waghmare, M. J. (2024). Effect of surya-namaskar on flexibility and abdominal muscles strength of college students. Journal of Arts, Humanities and Social Sciences. Volume - 7, Issue – 10. Pp. 38-41. DOIs:10.2018/SS/202410010.