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A Yogic Intervention On Strength Endurance, Flexibility And Body Fat Percentage; A Comparative Study

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Abstract: Objective of the study is to find out the effect of surya namaskar with the intensity of two minutes per repetitions for three weeks on selected variables i.e. strength endurance, flexibility and body fat percentage.
Procedure and Methodology: twenty male subjects (students) age ranging from 13 to 15 years were randomly selected for the purpose of the study. Strength Endurance, Flexibility and Body Fat Percentage was selected as the dependent variables. The pre-test and post-test randomized group design was used. The subjects were randomly divided into two groups i.e. Experimental Group (10nos) and control group (10 nos). Experiment Group was given Yoga Intervention with the intensity of two-minute pace per surya namaskar for three weeks. All the subjects were tested prior and after 3 (three) weeks of surya namaskar training with intensity of two minute on selected variables i.e. strength endurance, flexibility and body fat percentage. 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 groups the Analysis of Covariance (ANCOVA) was employed at .05 level of significance.
Results: The adjusted mean of experimental and control group on selected variables are as follows; 50.82 and 46.78 times in one minute for strength endurance (sit up), 16.90 and 14.80 inches for flexibility (sit and reach) and 15.18 and 15.81 percent for body fat percentage respectively.
Conclusion: The three weeks of surya namaskar training with the intensity of two minute can bring significant improvements on strength endurance and flexibility. But the insignificant difference was exit on fat percentage, and concluded that the three weeks of surya namaskar training with the intensity of two minute is good enough to bring the significant improvement on strength endurance and flexibility but not enough to bring the significant improvement on fat percentage of the school students.

Key words: *Surya namaskar, two-minutes duration, strength endurance, flexibility, body fat percentage, school students.*

Introduction: Yoga as the most popular exercise for a healthy living for all the age groups. One among the common exercise in yoga is the Surya Namaskar which elicited "high-to-moderate muscle activation of major postural muscles of the trunk and lower extremity during alternating flexion-extension movements of the spine, supporting its prescription in prevention and management of mechanical low back pain among vulnerable groups of people" (Mullerpatan, et al., 2020). Daily practice of yoga will enhance "physical and mental health so that body harmonization will be realized and in ultimately it can increase intellectual and spiritual intelligence" (Hemamalini, et al., 2024). Among the benefits of the yogic intervention the amount of getting the effectiveness is different with male and female (better flexion and extension than the male subject in various postures) practitioner (Prakash, et al., 2022). Surya namaskar can decreased the BMI as well as an increase in the physical fitness value of the youngest and middle old (Utami, et al., 2023, and Suwannakul, et al., 2024). Na Nongkhai, et al., (2021) also stated that yogic intervention can reduce the body fat percent and body fat mass by increasing muscle mass. Surya namaskar has different effects with different intensity as the study by Bhavanani, et al., (2011) demonstrated that "the effects of fast surya namaskar are similar to physical aerobic exercises, whereas the effects of slow surya namaskar are similar to those of yoga training". After a series of discussion and expert guidance the objective of the present study is to find out the effect of yogic intervention (surya namaskar with the intensity of two minutes) on physical abilities.

Methodology: twenty male subjects (students) age ranging from 13 to 15 years were randomly selected for the purpose of the study. Strength Endurance, Flexibility and Body Fat Percentage was selected as the dependent variables. The pre-

test and post-test randomized group design was used. The subjects were randomly divided into two groups i.e. Experimental Group (10nos) and control group (10 nos). Experiment Group was given Yoga Intervention with the intensity of two-minute pace per surya namaskar for three weeks. All the subjects were tested prior and after 3 (three) weeks of surya namaskar training with intensity of two minute on selected variables i.e. strength endurance, flexibility and body fat percentage. 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 groups 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
Strength Endurance	Experimental Group	50.82[a]	.74	49.26	52.39
	Control Group	46.78[a]	.74	45.21	48.34
Flexibility	Experimental Group	16.90[a]	.29	16.28	17.52
	Control Group	14.80[a]	.29	14.18	15.42
Fat Percentage	Experimental Group	15.18[a]	.22	14.72	15.64
	Control Group	15.81[a]	.22	15.35	16.27

a. Covariates appearing in the model are evaluated at the following Strength Endurance Pre, Flexibility Pre and Fat Percentage Pre with the following values = 46.00, 14.04 and 15.94 respectively.
The adjusted mean of experimental and control group on selected variables are as follows; 50.82 and 46.78 times in one minute for strength endurance (sit up), 16.90 and 14.80 inches for flexibility (sit and reach) and 15.18 and 15.81 percent for body fat percentage 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
Strength Endurance	Strength Endurance Pre	981.68	1	981.68	188.96	.000	.92
	Group	73.50	1	73.50	14.15	.002	.45
	Error	88.14	17	5.20			
	Total	49086.00	20				
	Corrected Total	1457.20	19				
Flexibility	Flexibility Pre	19.93	1	19.96	26.94	.000	.61
	Group	16.93	1	16.93	22.85	.000	.57
	Error	12.59	17	.74			
	Total	5062.00	20				
	Corrected Total	37.55	19				
Fat Percentage	Fat Percentage Pre	60.18	1	60.18	130.76	.000	.88
	Group	1.89	1	1.89	4.11	.059	.19
	Error	7.82	17	0.46			
	Total	4880.92	20				
	Corrected Total	78.40	19				

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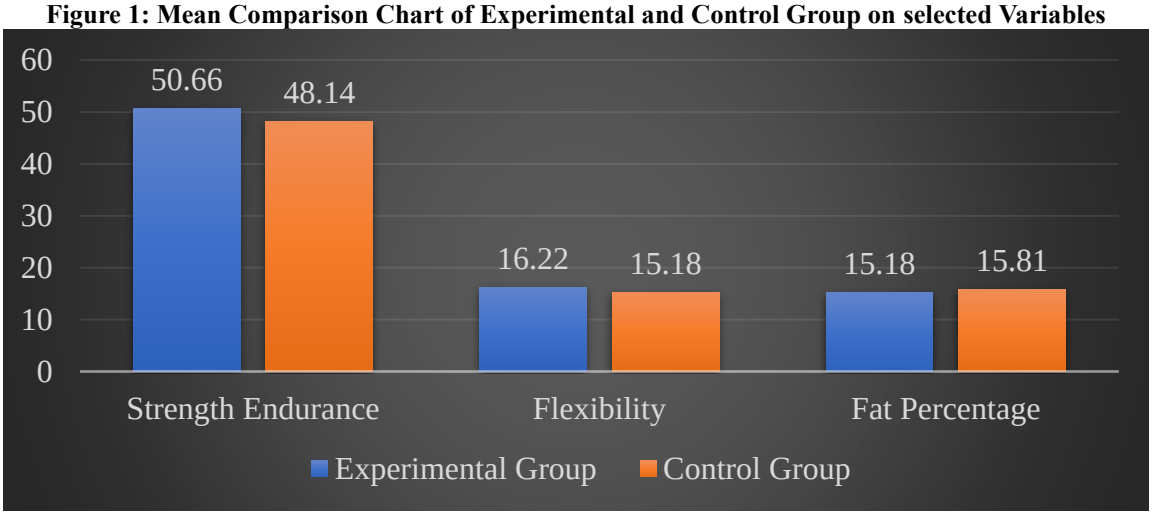
a. R Squared of Strength Endurance, Flexibility and Fat Percentage are as follows = .90 (Adjusted R Squared = .89), .67 (Adjusted R Squared = .63) and .90 (Adjusted R Squared = .89).
The ANCOVA table shows that there was a significant difference exists between experimental and control group on strength endurance and flexibility as the calculated values of strength endurance (.002), and flexibility (.000) are lesser than .05, which indicate that, there is significant improvement exist after three weeks of surya namaskar training with the intensity of two minute on strength endurance and flexibility. But the insignificant difference was exit on fat percentage (.059) as the calculated value is greater than .05, which indicate that the three weeks of surya namaskar training with the intensity of two minute is not enough to bring the significant improvement on fat percentage of the school students.

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
Strength Endurance	Experimental Group	Control Group	4.05*	1.10	.002	1.78	6.32
	Control Group	Experimental Group	-4.05*	1.10	.002	6.32	1.78
Flexibility	Experimental Group	Control Group	2.10*	0.44	.000	1.17	3.03
	Control Group	Experimental Group	-2.10*	0.44	.000	-3.03	-1.17
Fat Percentage	Experimental Group	Control Group	-0.63	0.31	.059	-1.29	.03
	Control Group	Experimental Group	0.63	0.31	.059	-.03	1.29

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
b. 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 findings have state that benefit of yogic intervention is next to uncountable. Some of the studies demonstrated that "surya namaskar yoga is a useful exercise for enhancing overweight and obese female university students' perceived stress scales and physical fitness" Suwannakul, et al., (2024). Srivastav, et al., (2020) and Pakkiraiah, et al., (2024) also stated that the twelve weeks of surya namaskar can reduce the body mass index and body composition. Suryanamaskara and aerobic training has significantly influenced body composition variables (Pakkiraiah, et al., 2024, and Kumar, A., & Singh, U., 2023). The above studies supported the present study where the significant improvement found after three weeks of surya namaskar training on general strength and flexibility. The eight weeks and twelve weeks of yogic exercises can reduce the body mass index and body fat mass (Na Nongkhai, et al., 2021). Study by Bhavanani, et al., (2011) also stated

that “surya namaskar has positive physiological and physical benefits benefits such as improvement of pulmonary function, respiratory pressures, and resting cardiovascular parameters and hand grip strength and endurance”. After going through the various studies and the researchers own understanding the duration of the yogic intervention is really a matter to consideration and necessary to understand. So, these might be a main factors or reason with the present study where there is no significant difference exist after three weeks of surya namaskar intervention with the intensity of two minutes on body fat percentage. And further it is also recommended that the duration of three weeks of yogic intervention is not good enough to bring significant changes on body fat percentage.

Conclusion: The present study came to the conclusion that, the three weeks of surya namaskar training with the intensity of two minute can bring significant improvements on strength endurance and flexibility. But the insignificant difference was exit on fat percentage, and which revealed that the three weeks of surya namaskar training with the intensity of two minute is good enough to bring the significant improvement on strength endurance and flexibility but not enough to bring the significant improvement on fat percentage of the school students.

References:

1. Bhavanani, A. B., Udupa, K., & Ravindra, P. N. (2011). A comparative study of slow and fast suryanamaskar on physiological function. *International Journal of Yoga*, 4(2), 71-76. DOI: 10.4103/0973-6131.85489.
2. Gupta, V. P. (2020). Effect Of Suryanamaskara in Sthaulya (Obesity)-A. *World Journal of Pharmaceutical Research*, Vol 9, Issue 6, 2338-2345. DOI: 10.20959/wjpr20206-17754.
3. Hemamalini, K., Wirawan, M., Puspa, A. A. O., & Wibawa, N. (2024). A study in the philosophy of surya namaskara for the physiological harmonization of the human body. *Jurnal Penelitian Agama Hindu*, 8(1), 1-16. DOI: https://doi.org/10.37329/jpah.v8i1.2659.
4. Kumar, A., & Singh, U. (2023). Effect of 10-week Yoga Intervention on Obesity on Working Male Professionals. *Chettinad Health City Med J*.; 12(1) :32-38. DOI: https://doi.org/10.24321/2278.2044.202306.
5. Mullerpatan, R. P., Agarwal, B. M., & Shetty, T. V. (2020). Exploration of muscle activity using surface electromyography while performing surya namaskar. *International Journal of Yoga*, 13(2), 137-143. DOI: 10.4103/ijoy.IJOY_72_19.
6. Na Nongkhai, M. P., Yamprasert, R., & Punsawad, C. (2021). Effects of continuous yoga on body composition in obese adolescents. *Evidence-Based Complementary and Alternative Medicine*, 2021(1), 6702767. https://doi.org/10.1155/2021/6702767.
7. Pakkiraiah, Y., Subba, K. R., & Raghavendra, B. (2024). Effects of suryanamaskara, aerobic and united suryanamaskara and aerobic training on body composition parameters of women. *International Journal of Physical Education, Sports and Health*; 11(3): 18-21. DOI: https://doi.org/10.22271/kheljournal.2024.v11.i3a.3314.
8. Prakash, S., Devaraj, A., & Karthik, V. (2022). Kinematic Analysis on Specific Joints During Practice of Sun Salutation Yoga Postures. In 2022 *6th International Conference on Intelligent Computing and Control Systems (ICICCS)* (pp. 297-303). IEEE. DOI: 10.1109/ICICCS53718.2022.9788186.
9. Srivastav, R., Hyanki, D., Chaurasia, P., & Bhardwaj, A. (2020). Effect of Surya Namaskar on highly sensitive C-reactive protein levels in overweight and obese middle-aged adults. *Int J Clin Exp Physiol*, 7(1), 33-5. DOI: 10.5530/ijcep.2020.7.1.8.
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. Utami, D. Y., Sumaryanti, S., Arovah, N. I., Graha, A. S., Suherman, W. S., & Putra, F. L. H. (2023). Effect of elderly fitness exercise combined with Surya Namaskar Yoga on the youngest and middle old'body mass index and physical fitness. *Jurnal Keolahragaan*, 11(2), 140-151. https://doi.org/10.21831/jk.v11i2.52401.