

The Effects of Dynamic Suryanamaskar on Flexibility of University Students

Choudhary, R* and Krzysztof Stec

Department of Physical Education, Banaras Hindu University, Varanasi.

Abstract

The objective of the study was to determine the effects of dynamic suryanamaskar (sun salutations) on the flexibility of selected physical education students at Banaras Hindu University, Varanasi. The subjects for this study were selected from the Department of physical education at Banaras Hindu University. A total of 20 male subjects were selected and used as one practice group. Dynamic suryanamaskar was considered the independent variable and flexibility was considered the dependent variable. Test was for flexibility. The repeated measures design was used for this study. Only one group of 20 participants was created. Tests were administered in equal intervals of two weeks. The tests started four weeks prior to the dynamic suryanamaskar (DSN) treatment and took place every two week thereafter, for a total of, three times. Tests took place every two weeks during the treatment and after the completion of the treatment, they were continued for the following four week period. To determine the effect of dynamic suryanamaskar on flexibility of selected physical education students at Banaras Hindu University, Varanasi, one way ANOVA was used at 0.05 levels of significance. In relation to flexibility, a significant ($p < 0.05$) effect of dynamic suryanamaskar was found.

Key words - Dynamic suryanamaskar, physical education, flexibility

Introduction

Suryanamaskar application and versatility make it one of the most useful and complete methods to bring about health and vigor while at the same time preparing an adept for the deeper processes of yoga. It is based on three elements: rhythm, energy and form. Form is evident in the twelve postures which are always performed in the same sequence. Such steady and continuous performance of postures which are coordinated with the breath activates the subtle energy called prana. This steady and rhythmic flow reflects the rhythm of the universe, such as biorhythms of the

body, which were expressed in the past by the science of the twelve zodiac phases. The rhythmic superimposition of the form and energy of suryanamaskar on our psychosomatic organism is a transforming force since it activates the psychic body in a completely different way than what any modern sport or game can do.

The benefits of a suryanamaskar practice are so wonderful and so many that for example, in the late 1940's, Shrimant Bhavanrao Pant Pratinidhi (1868-1951; Raja of Aundh 1909-1947)¹ made suryanamaskar a compulsory part of the physical training program in his kingdom's schools. He helped to popularize suryanamaskar as a simple physical exercise for the all-round development of an individual. Similarly, the director of the Department of physical education at Shri Aurobindo Ashram², says in his booklet that "a complete cycle of suryanamaskar consists of ten or twelve movementsthrough which one gets a good stretch and thorough exercise of the whole body. The body thus becomes strong, supple, agile and healthy. Suryanamaskar is a system of exercise for a common man". In fact, some experts, including Ayurvedic physicians, consider suryanamaskar to be "the crest jewel of exercises". Coronary blocks can also be treated through life-style changes in which yoga played a crucial part³. For this reversing heart disease program is running credited suryanamaskar as "the most beneficial yogic practice" for their heart patients. It is so highly regarded that entire books have been written on this single practice.

Most of the asanas in the procedure themselves have been documented in old literature. "Sashtang dandavat", which is the central asana of suryanamaskar, was practiced in India, from time immemorial, as a form of showing respect and complete surrender to god. "Bhujangasana" was described as one of the thirty-two most important asanas in "Gheranda Samhita" (dated around 1650 C.E.), which describes the yoga prevalent in North East India. The "Adhomukh Swanasana" was



The Effects of Dynamic Suryanamaskar on Flexibility of University Students

described in the old wrestling text of "Mallapurana" (dated before 1750). "Sarpasana" (Bhujangasana), "Gajasana" (Adhomukh Swanasana), "Uttanasana" and the series of postures done in tandem which are similar to suryanamaskar are all described in "Sritattvanidhi" which was written by the order of Krishnaraja Wodeyar III (1799-1868) to capture the Hindu knowledge of his time.

There are several levels of practice and mastery of this technique. For example, ayurvedic guidelines refer to three methods of practice, each one facilitating each one of the three doshas (vata, kapha and pita) in a unique way. Yogic guidelines however suggest four levels.

A beginner should start learning the sequence slowly, paying much attention to each posture and its many salient features. Therefore, after assuming each and every posture, one should maintain it for several breaths before moving on to the next one. During that time, one should "rotate consciousness" through a posture and correct any problems before moving on to the next one. This is the first and introductory level.

The second level starts when a practitioner has memorized all the postures, is able to coordinate each posture with his/her breathing and the flow of the practice is smooth and fluid. At this level, the practice should mature to a level where any major adjustments are not needed anymore, only micro-adjustments may be required.

The third level start when there is observed much automation of all the movements and breaths, so that all of the practitioner's attention can be focused on mantras. There are bija mantras or special solar mantras which can be repeated silently during the third level practice.

The fourth level of performance is the most advanced and requires one to perform each round of the suryanamaskar practice in about 7.5 seconds time, making 40 rounds per 5 minutes. According to a newly discovered scripture titled "Asanayoga - Hathabhasyapaddhati" by Kapalakurantaka, one needs to do at least several hundred rounds in this manner. More advanced sadhakas may even increase the number of rounds to several thousand.

The objective of the study was to determine the effects of dynamic suryanamaskar on the flexibility of

selected physical education students at Banaras Hindu University, Varanasi.

Experimental

Subjects

The subjects for this study were selected from the Department of physical education at Banaras Hindu University. A total of 20 male subjects were selected and used as one practicing group.

Variables

Dynamic suryanamaskar (sun salutations) was considered as independent variable and flexibility was considered as dependent variable.

Test for flexibility

Flexibility of back and leg muscles was measured by the Sit and Reach test. The subject was asked to remove shoes and place his feet against the testing box while sitting on the floor with straight knees. Then the subject was asked to place one hand on the top of the other so that the middle fingers of both hands were together at the same length. Bending of the knees was not allowed. The subject was asked to lean forward and place his hands without bouncing over the measuring scale lying on the top of the box for at least one second. The score was expressed in number of centimeters. Three trials are given and the highest score was recorded.

Experimental design

The Repeated Measures Design was used for this study. Only one group of 20 participants was created. Tests were administered in equal intervals of two weeks. The tests started four weeks prior to the Dynamic Suryanamaskar (DSN) treatment and took place every two weeks, for three times. Thereafter, tests took place every two weeks during the treatment and after the completion of the treatment, they were continued for the following four week period.

Experimental treatment (Dynamic Suryanamaskar (sun salutations) practice)

All subjects were assembled at Shivaji Hall (gymnasium and a weight training hall) at Banaras Hindu University, Varanasi and were briefed on the general objectives and requirements of suryanamaskar practice (SN), as well as on the specific objectives and requirements of the dynamic suryanamaskar practice (DSN).



The Effects of Dynamic Suryanamaskar on Flexibility of University Students

Data Set	1	Pre-Treatment	-4	Time (weeks)	-2	0	+2	+4	+6	+8	+10
	2										
	3	Treatment Starts			Treatment Period		Post-Treatment				

Subjects were administered the dynamic suryanamaskar practice in addition to regular participation in all other activities as scheduled by the Department of physical education at Banaras Hindu University, Varanasi.

Dynamic suryanamaskar training was carried out for a period of six weeks, six times per week (excluding university holidays) between December 15th, 2008 and January 24th, 2009. The scheduled time of the practice lasted for 45 minutes between 6:30 a.m. and 7:15 a.m. and was conducted instead of the students' regular conditioning period. Each and every practice period was concluded with five minutes of Shavasana.

Each day of the first week, suryanamaskar practice was demonstrated to the group by the research scholar and the most important points were reviewed several times. Afterwards, a review of the most important points and common mistakes was conducted once per week. Individual correction of suryanamaskar practice was conducted every day on an ongoing basis. Additionally, a number of stretching exercises were taught in order to facilitate better and more accurate execution of the individual asanas which are part of the suryanamaskar cycle.

Statistical analysis

To determine the effect of dynamic suryanamaskar on flexibility variable of selected physical education students at Banaras Hindu University, Varanasi, One Way ANOVA was used at 0.05 level of significance⁴.

Results and Discussion

The mean values and standard deviations of different trials are shown in Table 1. It appears from

Table 2 that the computed value of F in relation to the flexibility is greater than the required F (7,152) to be significant at 0.05 level of significance. Since the F-value was found to be significant, the Least Significant Difference (L.S.D.) Post Hoc test was applied for inter-group comparison (Table 3).

Table 1 Mean and Standard Deviation of eight different trials on flexibility

Trials	Mean	Standard Deviation
1	11.0500	8.10279
2	11.5750	8.33710
3	11.3250	8.31972
4	13.9500	7.11170
5	15.8750	6.91656
6	17.3500	6.11534
7	15.6750	6.34175
8	14.6500	6.63543

Table 2 Analysis of variance of flexibility in eight different trials

Sources of variation	DF	Sum of Square	Mean Sum of Square	F	Sig.
Between Groups	7	793.394	113.342	2.136	0.043
Within Groups	152	8064.350	53.055		

Table 3 Least Significant Difference (L.S.D.) Post Hoc test for comparison of the means of the trials of the effect of dynamic suryanamaskar on flexibility

Paired Means		Mean Difference	Sig.	
I	J	(I-J)		
Trial 1	Trial 2	-0.52500	0.820	
	Trial 3	-0.27500	0.905	
	Trial 4	-2.90000	0.210	
	Trial 5	-4.82500(*)	0.038	
	Trial 6	-6.30000(*)	0.007	
	Trial 7	-4.62500(*)	0.046	
	Trial 8	-3.60000	0.120	
	Trial 2	Trial 3	0.25000	0.914
Trial 4		-2.37500	0.304	
Trial 5		-4.30000	0.064	
Trial 6		-5.77500(*)	0.013	
Trial 7		-4.10000	0.077	
Trial 8		-3.07500	0.184	
Trial 3		Trial 4	-2.62500	0.256
		Trial 5	-4.55000	0.050
	Trial 6	-6.02500(*)	0.010	
	Trial 7	-4.35000	0.061	
	Trial 8	-3.32500	0.151	
	Trial 4	Trial 5	-1.92500	0.405

The Effects of Dynamic Suryanamaskar on Flexibility of University Students

	Trial 6	-3.40000	0.142
	Trial 7	-1.72500	0.455
	Trial 8	-0.70000	0.762
Trial 5	Trial 6	-1.47500	0.523
	Trial 7	0.20000	0.931
	Trial 8	1.22500	0.596
Trial 6	Trial 7	1.67500	0.468
	Trial 8	2.70000	0.243
Trial 7	Trial 8	1.02500	0.657

* The mean difference is significant at the 0.05 level.

1. There is no significant difference between Trial 1 and Trial 2, Trial 1 and Trial 3, and Trial 2 and Trial 3. This shows that no improvement took place in flexibility before the start of the treatment.
2. There is significant difference between Trial 3 and Trial 6. This shows that the treatment proved to be effective in the improvement of flexibility.
3. There is no significant difference between Trial 3 and Trial 4, Trial 4 and Trial 5 and Trial 5 and Trial 6. This indicates that the short duration (two weeks) of the treatment does not result in any flexibility effect.
4. There is significant difference between Trial 3 and Trial 6. This indicates that three intervals (two weeks each) are sufficient to bring a change in flexibility.
5. There are no significant differences between Trial 6 and Trial 7, Trial 7 and Trial 8 and between Trial 6 and Trial 8. This shows that the effect of dynamic suryanamaskar remains for two weeks even after a pause in treatment but the achieved performance decreases significantly after four weeks of rest.

It is being confirmed⁵ that physiological parameters like heart rate, blood pressure, oral temperature, skin temperature in resting condition, responses to maximal and sub-maximal exercise, body flexibility, etc. They found a significant improvement in performance at sub-maximal level of exercise. Shoulder, hip, trunk and neck flexibility improved in the yoga group. A significant increase in flexibility for the hip, hip and trunk, and neck for the yoga group was also reported⁶. The significant effect of various Hatha yogic practices on flexibility was also reported

previously^{5,7}. The present study confirmed that yoga in general has a significant impact on flexibility and specifically that dynamic suryanamaskar also supports in this effect all other yogic asanas and practices. The Post Hoc Least Significant Difference Test in relation to flexibility shows that the duration of the six weeks of the treatment was sufficient to bring about significant difference (Mean Difference = -6.025). The study also shows that the effect of dynamic suryanamaskar remains for two weeks even after a pause in treatment but the achieved performance decreases significantly after four weeks of rest.

References

1. Pant, Pratinidhi B. 1989. *The Raja of Aundh: Surya Namaskara - an Ancient Indian Exercise*. Orient Longman: Hyderabad.
2. Bhattacharya, PB. 2007. *Surya Namaskara*. Sri Aurobindo Ashram Trust: Pondicherry : 9.
3. Dean, O. 1996. *Dr. Dean Ornish's programme for reversing heart disease*. Ivy Books: U.S. : 631.
4. Verma, JP. 2000. *Sports Statistics*. Venus Publications, Gwalior.
5. Ray, US, Hedge, KS and Selvamurthy, W. 1983. Effects of yogic asanas and physical exercise on body flexibility in middle aged men. *The Yoga Review Summer and Autumn*, 3(2&3):75-79.
6. Robin, M. 1972. *Effect of yoga on flexibility and respiratory measures of vital capacity and breath holding time*. Doctoral dissertation. University of Oregon.
7. Tran, MD, Holly, RG, Lashbrook, J and Amsterdam, EA. 2001. Effects of Hatha Yoga practice on the health-related aspects of physical fitness. *Preventive Cardiology Autumn*, 4(4):165-170. PMID: 11832673