EFFECT OF SURYANAMASKAR ON FLEXIBILITY AND ITS TREND ON YOUTH

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Introduction

Suryanamaskar is an ancient Indian method of offering prayers to the rising Sun in the morning along with a series of physical postures with regulated breathing aiming at range of physical, mental and spiritual benefits(Parag and Manjunath, 2012). Suryanamaskar is a graceful combined sequence of twelve postures along with regulated breathing and relaxation. It relieves stiffness, revitalizes the body, refreshes the mind and purifies subtle energy channels. There are number of study have been conducted on Suryanamaskar and found significant improvement in flexibility (Choudhary and Krzytof, 2010).

Flexibility refers to the range of movement and mobility around a joint, basically shows how far a body part can move around joints. Range of motion is depends on muscle bulk, the surrounding tissue, the structure of the joint, skin and muscle length (Michael, 2004). From asanas point of view, muscle length which can be modified and stretching is the primary method by which muscle lengthening can occur. A muscle has both an origin and an insertion point, basically the two ends of a muscle. At each end of the muscle, a tendon attaches that muscle to the bone. Stretching involves taking these two ends of the muscle further apart to lengthen the muscle and tendons, and maintain this length of muscle in the long term. One of the most important benefits of a flexibility program is the potential of relaxation. Physiologically, relaxation is the cessation of muscular tension. Undesirably high level of muscular tension has several negative side effects, such as decreasing sensory awareness and raising blood presser. It also wastes energy, a contracting muscles requires more energy than relaxed muscle. Furthermore, habitually tens muscles tend to cut off their own circulation. Reduced blood supply result in a lack of oxygen and essential nutrients and causes toxic waste products to accumulate in the cells. This process predisposes one to fatigue, aches and even pain. (Michael, 2004).

Practice of asanas is one of the best ways to improve flexibility. There are plenty of studies have been done to see the effect of yogic asanas on flexibility, and Suryanamaskar is itself combination of six asanas. (Shankar and Pancholi, 2011). Going through many research papers this query has been rise to find in which trend (pattern) flexibility improve and how much time is needed for significant improvement in flexibility. The objective of the study was to determine the effect of Suryanamaskar on flexibility and its trend.

Methods

Subjects: The subjects for this study were selected from the Kiddy's Corner School, Gwalior. Fifteen boys in the age group of 16 – 18 from class 11 were selected randomly for this study.

Variables: Suryanamaskar was considered as independent variable and flexibility was considered as dependent variable.

Test for flexibility: Flexibility of lower back and leg muscles was measured by 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 top of the other hand so that the middle fingers of both hands were together at the same length. The subject was asked to lean forward and place his hands without bouncing over the measuring scale on the top of the box for at list one second. Bending of knee was not allowed. The score was expressed in number of centimeters. Three trials were given and the highest score was recorded.

Experimental design: The repeated measures design was used for this study. Only one group of 15 boys was created. Total treatment duration was six weeks. Tests were administered in equal interval of two weeks. The tests were started four weeks prior to the Suryanamaskar treatment and took place every two weeks, for three times. Thereafter, test took place every post two weeks during the treatment.

Trials	1	2	3	4	5	6
	Pr-treatment	Pr-treatment	Pr-treatment	Treatment	Treatment	Treatment
Time(weeks)	-4	-2	0	+2	+4	+6

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 between 1-9-2012 to 20-10-2012. The scheduled time of practice lasted for 30-40 minutes during their physical education period. 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. Afterwards, a review of the most important and common mistakes was conducted once per week. The pace(speed) of Suryanamaskar was 2 minutes for each round. Pace of Suryanamaskar was control by Racer 7 Jewels Stop Watch. Each step(asana) took around 10 seconds. Practice of Suryanamaskar was performed according book Asana Pranayama Mudra Banndha (Bihar School of Yoga). 12 steps of Suryanamaskar are below in table.

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

To determine the effect of Suryanamaskar on flexibility and its trend on youth, one way repeated ANOVA was used and level of significance was set at 0.05.

Results

In table 1 Shapiro-wilk test used to ensure data is normal or not and P-value is more than 0.05 in all trials, which shows that data is normal.

Table 1 : Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	p-value	Statistic	df	p-value
Trial 1	.164	13	.200*	.939	13	.448
Trial 2	.088	13	.200*	.961	13	.769
Trial 3	.115	13	.200*	.960	13	.757
Trial 4	.182	13	.200*	.927	13	.314
Trial 5	.121	13	.200*	.962	13	.780
Trial 6	.194	13	.193	.942	13	.479

The mean values and standard deviation of different trails are show in table 2.

Table 2 : Descriptive statistics of six different trials of flexibility

	Mean	Std. Deviation	N
Trial-1	21.46	4.27	13
Trial-2	21.69	4.39	13
Trial-3	21.88	4.77	13
Trial-4	22.65	2.30	13
Trial-5	26.96	2.72	13
Trial-6	29.36	1.95	13

In table 3 Mauchly's test was applied to check the assumption of sphericity. The p-value is 0.000 which is less than 0.05, so we found that the assumption of sphericity has been violated.

Table 3 Mauchly's Test of Sphericity

Within subjects effect	Machly's W	Approx. chisquare	df	p-value	Epsilon		
					Greenhouse-geisser	Huynh-feldt	Lower-bound
Trials	.001	68.445	14	.000	.259	.278	.200

After violated of sphericity assumption we used greenhouse geisser correction, because epsilon value is less than 0.75(in table 3).

In table 4 (tests of within-subjects effect) p-value is 0.000 (f=32.392) which is less than 0.05, which indicated that there is significant different between trials.

Table 4 Tests of Within-Subjects Effects

Source	df	F	p- value
Greenhouse-geisser	1.29	32.39	.00

Now pair wise comparison of mean between trials is show in table 5.

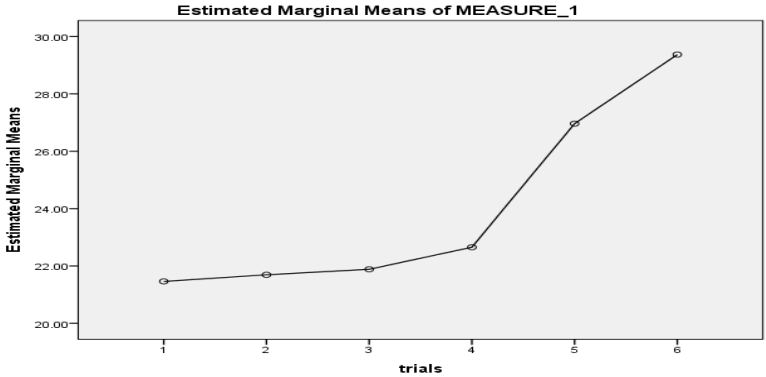
Table 5 Pairwise comparison

Trails		Mean difference	p- value
Trial1	Trail2	- .231	1.000
	Trial3	-.423	1.000
	Trail4	-1.192	1.000
	Trial5	-5.500*	0.002
	Trial6	-7.908*	0.000
Trial2	Trail3	-.192	1.000
	Trial4	-.962	1.000
	Trial5	-5.269*	0.003
	Trial6	-7.677*	0.000
Trial3	Trial4	-.769	1.000
	Trial5	-5.077*	0.007
	Trial6	-7.485*	0.000
Trial4	Trial5	-4.308*	0.000
	Trial6	-6.715*	0.000
Trial5	Trial6	-2.408*	0.000

**The mean difference is significant at the 0.05 level.*

Table 5 shows that there is no different between trial 1 and trial 2, trial 1 and trial 3, trial 2 and trial 3. This shows that no improvement took place in flexibility before the start of the treatment or practice of Suryanamaskar. There is no significant different between trial 3 and trial 4. This indicated that the short duration (two weeks) of practice dose not significantly improve flexibility. There is significant different between trail 3 and trail 5, trial 3 and trial 6, Trial 4 and trial 5, trial 5 and trial 6. This indicated that the 4 weeks practice of Suryanamaskar is sufficient to bring a significantly improve flexibility.

Figure-1



In figure 1: Graphical representation of trend of flexibility.

Discussion

The purpose of the study was to determine the effect of Suryanamaskar on flexibility and its trend on youth. The finding of the study revealed that there was a significant improvement found in flexibility due to regular practice of Suryanamaskar. The finding is in agreement with the results of (Choudhary and Krzytof, 2010) and (Shankar and Pancholi, 2011). Muscle has a viscoelastic property. Basically this means that it is not perfectly elastic, like a rubber band. When a rubber band is stretched it returns to its normal length. Over time however, when muscles are stretched they experience creep, that is, they gradually get longer, thus increasing flexibility (Michael, 2004). In same way in Suryanamaskar practice we perform flexion and extension or hyperextension of hip joint which improve flexibility of hip joint, lower back and posterior thigh muscles.

In study pair wise comparison shows that the duration of six weeks of treatments was sufficient to bring out significant different (improvement) in flexibility and also shows that the short duration of only two weeks of the treatment was not effective enough to bring about any significant difference, while a significant difference was noted after at least four weeks of treatment. In This way present study confirmed that practices of Suryanamaskar has a significance improvement found in flexibility.

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