

Influence of Suryanamaskar Practice on Selected Physical Fitness Variables of Adolescent Students

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Abstract-- The purpose of the study was to find out the effect of Surya Namaskar practice on the physical and psychological fitness of college students. 60 male subjects were selected from different colleges in West Bengal for the study. The age of the subjects ranged from 20 to 25 years. The selected subjects were divided into two groups with 30 subjects. One group was the Surya Namaskar practice group and the other was the control group. Each group was selected randomly.

The training period of the experimental group was eight weeks, five days per week, with a duration of 45 minutes. The control group did not undergo any training program other than their routine work. The data were collected on Physical fitness components that speed, explosive power, and flexibility of the two groups before the experimental period (pre-test) and also after eight weeks of training (post-test). Physical fitness components were tested by using standardised tests.

To find out the effect of treatment on the physical fitness variables of the subjects the primary data was analyzed by using suitable statistical methods. The result showed the enhancement of mean performance scores of three physical fitness variables in the case of the experimental group after eight weeks, five days per week, with a duration of 45 min. Surya Namaskar practice. The control group showed no improvement due to treatment. Significant improvement was noticed in flexibility performance in the case of the experimental group.

Keywords-- Surya Namaskar, Physical Fitness variables, Treatment, College students

I. INTRODUCTION

Yoga is centred around achieving harmony between the mind and body through a combination of movements, breathwork, postures, relaxation techniques, and meditation. This holistic approach fosters a healthy, vibrant, and balanced lifestyle. Notably, yoga is not confined to personal wellness but extends its benefits to the realm of games and sports. It significantly enhances various physical fitness components vital for athletes. Regular practice of yoga, alongside other fitness routines, contributes to improving flexibility, strength, endurance, balance, and rhythm, as well as promoting meditation and relaxation. Incorporating yoga into a fitness regimen can substantially enhance specific fitness aspects crucial for enhancing performance in competitive sports.

In Sanskrit, "surya" translates to "sun," while "namaskar" means "greeting" or "salutation." Thus, Surya Namaskar, or Sun Salutation, is essentially a tribute to the sun. This ancient ritual consists of twelve steps designed to warm up the body in preparation for yoga practice, hence its placement at the beginning of a yoga session. The historical significance and comprehensive benefits of this warming sequence extend to both physical and mental well-being. Delve deeper into this revered and ancient yoga tradition to uncover its profound significance.

Surya Namaskar is often referred to as a "kriya," derived from the Sanskrit root "kri," meaning "to do." Therefore, it is more accurately labeled as a kriya rather than merely a series of asanas. This sequence of twelve steps is intricately linked to stimulating the solar plexus, fostering the rise of solar energy within the body, and connecting with the energy of the sun itself.

A. Surya Namaskar Kriya

Kriyā is a Sanskrit term. It is derived from the Sanskrit root, kri, meaning "to do". Kriyā means "action, deed, effort". The correct way to refer to Sun Salutations is to call it a kriya. Surya Namaskara is an action consisting of 12 steps. Unlike popular belief, it is *not* a series of asanas! Surya Namaskara Kriya is linked to engaging the solar plexus to raise solar energy within the body and to solar energy itself.

B. The Purpose of Surya Namaskar

Performing asanas in the rays of the sunrise sounds beautiful and inviting but what are the real reasons why we should practice Surya Namaskar?

Surya Namaskar comprises 12 steps that are purposefully woven together to benefit the mind and body in various ways. Surya Namaskar is a practice in itself as well as a warm-up before performing further yoga asanas. It allows for "opening" of the body as it stretches, strengthens and lengthens all muscle groups. Surya Namaskar stimulates *prana*, life force energy, through the body, helping to regulate our mental and physical faculties.

Through its systematic execution, Surya Namaskar facilitates the opening, stretching, strengthening, and lengthening of all muscle groups, while also invigorating the prana, or life force energy, to regulate mental and physical faculties.

Rooted in Vedic tradition, Surya Namaskar embodies the dual aspects of the sun, symbolised as Gayatri and Surya in Hindu mythology. Gayatri represents the nurturing and life-giving feminine energy, akin to yin energy, while Surya embodies the invigorating and activating masculine energy, akin to yang energy. Contrary to common perception, the practice of Surya Namaskar is traditionally performed facing away from the rising sun to receive its stimulating and warming energy along the spine, symbolizing a reverence for the life-giving force of Surya.

The benefits of Surya Namaskar extend across various dimensions of health, both physical and mental. As scientific inquiry delves deeper into its effects, a convergence of Western and Eastern medical perspectives unveils its holistic benefits. By exploring the physical health advantages, including improved blood circulation, strengthened cardiovascular function, and enhanced respiratory capacity, as well as its positive impact on mental well-being, Surya Namaskar emerges as a potent practice with profound implications for overall health and vitality.

II. METHODOLOGY

A. Subjects:

The purpose of the study was to find out the effect of Surya Namaskar practice on the selected physical fitness variables of college students. 60 male subjects were selected from different colleges in West Bengal for the study. Age of the subjects will be ranged from 20 to 25 years. The selected subjects were divided into two groups of 30 subjects. One group was the Surya Namaskar practice group or Experimental Group (EG) and the other was the control group (CG). Subjects of each group were selected randomly.

B. Criterion Measure:

Sl. No.	Variables	Unit	Instrument/Test
1.	Speed	Second	50m Dash
2.	Leg Explosive Strength	Meter	Standing Broad Jump
3.	Flexibility	Centimetre	Flexometer Box

C. Research Design:

The training period of experimental groups was eight weeks, five days per week, with a duration of 45 minutes. The control group did not undergo any training program other than their routine work. The data were collected on the physical fitness components of speed, explosive power, and flexibility of the two groups before the experimental period (pre-test) and also after eight weeks of training (post-test), respectively. Physical fitness components were tested using standardised tests.

III. RESULT AND DISCUSSION

Table No.1 Descriptive statistics of CG

Group/ Variable	SBJ (m)				50m dash (s)				Sit and Reach (cm.)			
	Mean		SD		Mean		SD		Mean		SD	
	Pre Test	Post Test	Pre Test	Post Test	Pre Test	Post Test	Pre Test	Post Test	Pre Test	Post Test	Pre Test	Post Test
CG	1.992	1.991	0.24	0.24	8.75	8.73	1.19	1.18	36.4	36.6	1.19	1.18

Table No. 1 presents data on various variables measured before and after a certain intervention, likely related to physical fitness or sports performance. Here's an analysis of the table:

It appears to include the Control Group (CG) and variables such as SBJ (standing broad jump), 50m dash (sprint time), and Sit and Reach (flexibility).

For SBJ (m), the mean values for the pre-test and post-test measurements are 1.992 meters and 1.991 meters, respectively. The standard deviation (SD) for both measurements is approximately 0.24 meters. For 50m dash (s), the mean values for the pre-test and post-test measurements are 8.75 seconds and 8.73 seconds, respectively. The standard deviation for both measurements is approximately 1.19 seconds. In the case of Sit and Reach (cm), the mean values for the pre-test and post-test measurements are 36.4 cm and 36.6 cm, respectively. The standard deviation for the pre-test is approximately 1.19 cm, and for the post-test, it's approximately 1.18 cm.

Overall, the table provides quantitative data on the performance of the control group across different physical fitness measures before and after the intervention. It allows for comparison to assess any changes or improvements resulting from the intervention.

Table No. 2 Descriptive statistics of EG

Group/Variable	SBJ (m)				50m dash (s)				Sit and Reach (cm.)			
	Mean		SD		Mean		SD		Mean			SD
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
EG	1.93	2.07	0.30	0.26	8.20	8.06	0.96	0.91	27.4	32.8	5.80	6.04

Table No. 2 presents data on various variables measured before and after an intervention for a different group, likely an experimental group (EG). Here's an analysis of the table:

In this case, it's the Experimental Group (EG) and variables such as SBJ (standing broad jump), 50m dash (sprint time), and Sit and Reach (flexibility). In the case of SBJ (m), the mean values for the pre-test and post-test measurements are 1.93 meters and 2.07 meters, respectively. The standard deviation (SD) for the pre-test is approximately 0.30 meters, and for the post-test, it's approximately 0.26 meters. In the case of the 50m dash (s), the mean values for the pre-test and post-test measurements are 8.20 seconds and 8.06 seconds, respectively. The standard deviation for the pre-test is approximately 0.96 seconds, and for the post-test, it's approximately 0.91 seconds. In the case of Sit and Reach (cm), the mean values for the pre-test and post-test measurements are 27.4 cm and 32.8 cm, respectively. The standard deviation for the pre-test is approximately 5.80 cm, and for the post-test, it's approximately 6.04 cm.

Compared to Table No. 1, the experimental group (EG) has shown improvements in most variables after the intervention.

Specifically, there are increases in the standing broad jump distance and sit-and-reach flexibility, and decreases in the time taken for the 50m dash, indicating potential enhancements in physical performance. However, further statistical analysis would be needed to determine the significance of these changes and to draw more definitive conclusions about the effectiveness of the intervention.

Table No.3 Paired sample t-test, using T distribution concerning Pre and Post-test means of 50m dash of CG

50m dash	Pre Test	Post Test	"t" value	p-value	Remarks
MEAN	8.75	8.73	0.04677	0.9629	Not significant
SD	1.19	1.18			

Table No. 3 shows that since $p\text{-value} > \alpha$, H_0 cannot be rejected. The average of the **pre-test speed of CG's** population is assumed to be **equal to** the average of the **post-test speed of CG's** population. In other words, the difference between the sample average of **Pre-Test Speed CG** and **Post-Test Speed CG** is not big enough to be statistically significant.

Table No.4 Paired sample t-test, using T distribution concerning Pre and post-test means of SBJ test of CG

SBJ	Pre Test	Post Test	"t" value	p-value	Remarks
MEAN	1.992	1.991	0.01535	0.9878	Not significant
SD	0.24	0.25			

Table No. 4 showed that $p\text{-value} > \alpha$, so, H_0 cannot be rejected. The average of the **Test SBJ mean of CG's** population is assumed to be **equal to** the average of the **test SBJ mean of CG's** population. In other words, the difference between the sample average of the **test SBJ mean of CG** and the **post-test SBJ mean of CG** is not big enough to be statistically significant.

Table No.5 Paired sample t-test, using T distribution concerning Pre and post-test means of Sit & Reach test of CG

Sit & Reach	Pre Test	Post Test	"t" value	p-value	Remarks
MEAN	36.4	36.6	-0.08935	0.9291	Not significant
SD	8.71	8.62			

Table No. 5 showed that $p\text{-value} > \alpha$, so H_0 cannot be rejected. The average of the **test SR of CG's** population is assumed to be **equal to** the average of **Post Test SR of CG's** population. In other words, the difference between the sample average of **Pre Test SR mean of CG** and the **Test SR mean of CG** is not big enough to be statistically significant

Table No.6 : Paired sample t-test , using T distribution concerning Pre and Post test mean of 50m dash test of EG

50m dash	Pre Test	Post Test	"t" value	p-value	Remarks
MEAN	8.20	8.06	0.5904	0.5572	Not significant
SD	0.96	0.91			

Table No. 6 showed that $p\text{-value} > \alpha$, so H_0 cannot be rejected. The average of the **pre-test of EG's** population is assumed to be **equal to** the average of the **post-test of EG's** population. In other words, the difference between the sample average of the **pre-test mean of EG** and the **post-test mean of EG** is not big enough to be statistically significant.

Table No.7: Paired sample t-tests, using T distribution concerning Pre and Post-test mean of SBJ Test of EG

SBJ	Pre Test	Post Test	"t" value	p-value	Remarks
MEAN	1.93	2.07	-1.9905	0.05135	Not significant
SD	0.30	0.26			

Table No. 7 showed that $p\text{-value} > \alpha$, so H_0 cannot be rejected. The average of the **Pre-Test EG's** population is assumed to be **equal to** the average of the **Post-Test EG's** population. In other words, the difference between the sample average of **pre-test EG** and **Post-Test EG** is not big enough to be statistically significant.

Table No.8: Paired sample t-test, using T distribution concerning Pre and Post-test mean of Sit and Reach Test of EG

Sit & Reach	Pre Test	Post Test	"t" value	p-value	Remarks
MEAN	27.4	32.8	-3.4888	0.0009339	Significant
SD	5.80	6.04			

Table No. 8 shows that $p\text{-value} > \alpha$, so H_0 is rejected. The average of **Pre SR EG's** population is considered to be **not equal to** the average of **Post SR EG's** population. In other words, the difference between the sample average of **Pre SR EG** and **Post SR EG** is big enough to be statistically significant.

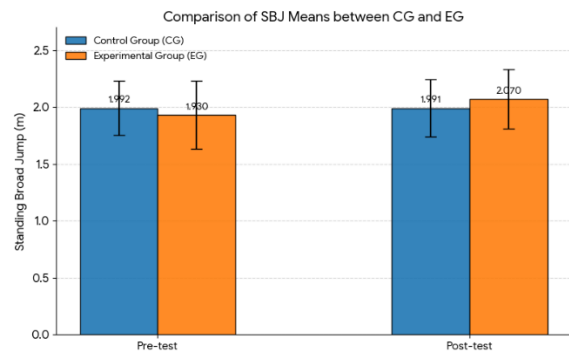


Fig. No. 1: Comparison of SBJ Means

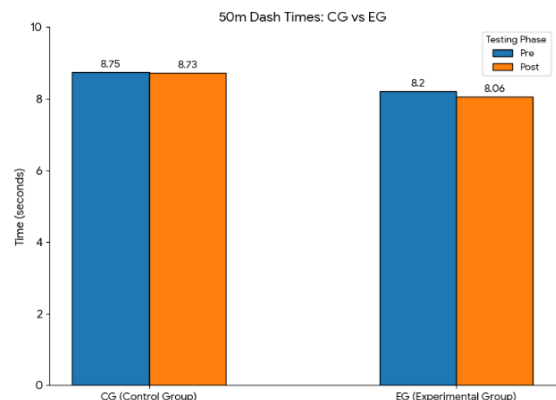


Fig. No. 2: Comparison of 50m dash means

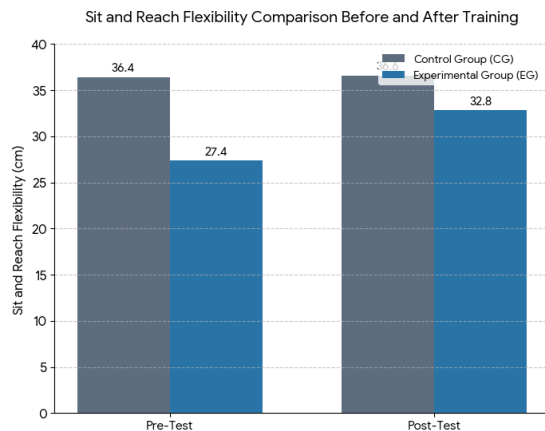


Fig. No. 3: Comparison of Sit & Reach means

The result showed the enhancement of mean performance scores of three physical fitness variables in the case of the experimental group after eight weeks, five days per week, with a duration of 45 min. Suryanamaskar practice.

In a study conducted by Sarkar, D. (2022) the researcher concluded that the Surya Namaskar practices improve the physical fitness variables. Through this study, they suggested that Surya Namaskar practices be administered to all the Bachelor of Physical Education students to improve their selected physical fitness variables.

Kumari and Thakur (2019) concluded that Yogic exercises are not just about physical fitness. They also specify that more significantly, it is a way of life that promotes overall wellness, which includes mental, physical, emotional, as well as spiritual well-being.

They also concluded that Suryanamaskar as a yogic exercise had a significant effect and improvement on selected health-related fitness components (Flexibility) in female Taekwondo Female Players. Thus, such a type of training can improve different components of health and skill-related physical fitness.

The findings of our study are very much relevant to the findings of the previous studies.

The study's findings align with those of Dabre (2002), who investigated the impact of ageing on various physiological and psychological parameters among yoga practitioners, dynamic exercise practitioners, and inactive adults. Dabre demonstrated that yoga asanas can enhance physiological and psychological variables in adults, including heart rate and metabolic rate, thus improving overall exercise capacity. Additionally, Brown et al. (1994), as cited by Harinath (2004), found that three months of yogic practices led to enhanced cardio-respiratory performance.

Similarly, Joshi (1992) observed that a six-week pranayama course resulted in improved ventilator function, including decreased respiratory rate and increased forced vital capacity, forced expiratory volume, maximum voluntary ventilation, peak expiratory flow rate, and breath-holding time. Furthermore, Yadav and Das (2001) reported significant increases in forced vital capacity, forced expiratory volume, and peak expiratory flow rate following 12 weeks of yoga training.

IV. CONCLUSION

The results showed an enhancement in the mean performance scores of three physical fitness variables in the experimental group after eight weeks, with training five days per week for 45 min per session. Suryanamaskar practice. The short-term practice of Suryanamaskar can significantly improve participants' flexibility compared with the control group.

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