

# Effect of suryanamaskar on handgrip strength in healthy volunteers in the age group of 20-40 years

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## Abstract

**Introduction:** Yoga helps in improvement of physical strength and neuromuscular co-ordination. Suryanamaskar (Sun Salutation) is an integral part of Yogic exercises. It involves exercising almost all the muscles and joints of the body. Hand grip strength (HGS) is not only a measure of the strength of muscles of the upper limb but also neuromuscular co-ordination. The objective of the study was to evaluate the effect of suryanamaskar on HGS in healthy adult subjects. 120 newly enrolled healthy volunteers (62 females) in the age group of 20 to 40 years were selected from a reputed Yoga canters in Mumbai. HGS was measured using hand grip dynamometer set at second handle position at 0° and 90° elbow flexion before the start of study. The subjects were then instructed to practice suryanamaskar for 30 minutes daily for 12 weeks. HGS was measured after completion of study period. Paired t test was used for analysis of data. It was observed that the mean HGS before study was 27.73 which increased significantly to 30.28 after the practice of suryanamaskar ( $p < 0.001$ ). We conclude that the increase in hand grip strength is probably due to strengthening of the muscular system of the body also involving upper limb muscles due to stimulation of muscles during the isometric contraction maintained during the steady state of yogic postures and improved co-ordination as a result of practice of suryanamaskar.

**Keywords:** Hand grip strength; suryanamaskar

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## INTRODUCTION

Yoga is an experiential science. Healthy life can be considered as a by-product of practicing yogic techniques since it has been observed that yoga practitioners are physically and mentally more healthy. Yoga has a beneficial role in the functioning of muscular system and the nervous system in addition to other systems of the body. Suryanamaskar (Sun Salutation) is an integral part of yogic exercises. It is a sequence of yogic postures (asanas) in which each posture is co-ordinated with breathing. Each posture is maintained steady for a brief

duration of time. Suryanamaskar enhances our life-span and strength and intellect. Head, neck, hands, legs, chest, abdominal muscles, spine, toes, knees and all body joints are exercised. Heaviness of the stomach, unwanted fat, thyroid disorders, some minor orthopedic disorders and disorders of throat diminish with regular practice of suryanamaskar<sup>1</sup>. Hand grip strength is a measure of the strength of forearm muscles. It also tests the co-ordination of the upper limb neuromuscular system. The purpose of this testing is diverse, including to diagnose diseases, to evaluate and compare treatments, to document progression of muscle strength, and to provide feedback during the rehabilitation process as a measure indicating the level of hand function.<sup>2</sup> Studies to determine whether breathing through a particular nostril has a lateralized effect on hand grip strength found out that yoga breathing through a particular nostril, or through alternating nostrils increases hand grip strength of both the hands without lateralization<sup>3</sup>. Although several studies were conducted providing evidences that yogic breathing exercises improve the strength of body musculature<sup>4,5</sup> there is lack of information concerning the effect of suryanamaskar on muscle strength. Therefore this study was undertaken to

evaluate the effect of suryanamaskar on strength of upper limb muscles.

### MATERIALS AND METHODS

For the present study, 120 newly enrolled healthy volunteers (62 females and 58 males) in the age group of 20 to 40 years were selected from one of the reputed Yoga centers in Mumbai. The ethical committee was informed about the nature of the current study and a permission to conduct the study was obtained. Written informed consent of the volunteers fulfilling inclusion criteria was obtained before the procedure. Prior to study, required pre-test instructions were given. Both male and female volunteers were selected randomly. Volunteers without any major illnesses like hypertension, diabetes, heart diseases and neuromuscular disorders were included. Proper history was noted and general and systemic examination was done. Volunteers were instructed not to practice any other exercise other than the prescribed ones. Hand grip strength was measured using a Smedley’s hand grip dynamometer manufactured by Anand Agencies, Pune. All the instructions given in the brochure by the manufacturer were strictly followed. The hand grip dynamometer was set at second handle position. The upper extremity was positioned with shoulder adducted, neutrally rotated, forearm neutral, wrist slightly extended. Grip strength was measured at 0° and 90° elbow flexion. Volunteers were allowed three attempts in each position and the highest of the readings was noted in kilograms. To avoid fatigue, rest of 30 seconds between each attempt was allowed. After recording the hand grip strength before the start of the study, the volunteers were instructed about the suryanamaskar training session which they would be performing daily for 30 min for a period of 12 weeks. The procedure for suryanamaskar is mentioned below in detail.

1. Stand on your Yoga mats and start with the Yoga Mountain Pose. Bring your palms together in prayer position. Exhale.
2. As you inhale, raise your arms overhead, keeping your palms together.

3. Exhale and then bend forward until your hands touch your feet.
4. As you inhale, step the right leg back, arch back and lift your chin.
5. Exhaling, step the left leg back into plank position. Keep your spine and legs in a straight line and support your weight on hands and feet.
6. Retaining the breath, lower your knees, your chest and then your forehead, keeping your hips up and toes curled under.
7. Inhaling, stretch forward and bend back. Keep your arms straight.
8. Exhaling, curl your toes under, press down into your heels, and lift your hips.
9. As you inhale, bring your right leg forward, with the top of the foot stretched out flat on the floor, and lift your chin.
10. Exhale and then bend forward until your hands touch your feet.
11. Inhaling, stretch your arms forward and over your head. Slowly bend backward from the waist.
12. Exhaling, gently come back to Tadasana.

The volunteers were followed closely with respect to their routine of practicing suryanamaskar daily for a period of 12 weeks. At the end of this period, the hand grip strength was again recorded in all the 120 volunteers. We used Paired t test to compare the hand grip strength before and after study i.e. before and after the practice of Yoga daily for a period of 12 weeks. The descriptive statistics were used i.e. mean and standard deviation (SD) for describing the parameter. Analysis was done by SPSS-IS software. The P-value < 0.005 was considered significant.

### RESULTS

The data entry was done in MS-EXCEL and the analysis was done by SPSS-IS software. The descriptive statistics were used i.e. mean and standard deviation (SD). Paired t test was used to compare hand grip strength before and after study period.

**Table 7:** Comparison of Hand Grip Strength (HGS) before and after practice of suryanamaskar

Sex	Hand Grip Strength	N	Mean	Std. Deviation	P value	Significance
Male	Pre HGS	58	33.59	2.478	<0.001	Significant
	Post HGS	58	36.33	1.995		
Female	Pre HGS	62	22.26	2.958	<0.001	Significant
	Post HGS	62	24.61	3.499		
Total	Pre HGS	120	27.73	6.304	<0.001	Significant
	Post HGS	120	30.28	6.537		

(Paired t test) (P < 0.05 - Significant)

The above table shows the Hand-Grip Strength (HGS) of the subjects before and after the practice of Yoga. We

used Paired t test for analysis. It was observed that in the total study sample, the mean HGS before study was 27.73

which increased significantly to 30.28 after the practice of suryanamaskar. The standard deviation is 6.304 for pre-study HGS and 6.537 for post-study HGS. The P value is significant at less than 0.001.

## DISCUSSION

Yoga, an ancient culture of Indian heritage, when adopted as a way of life is claimed to bestow the practitioner with ideal physical, mental, intellectual, and spiritual health. As a result, Yoga is fast emerging as a new discipline for integrating mind and body into harmony. Regular yogic practices have been shown to cause profound improvement in cardiorespiratory<sup>6</sup>, thermoregulatory<sup>7</sup>, body flexibility, muscle strength, neuromuscular co-ordination and psychological functions such as mental performance, improvement of memory, and creation of a sense of well-being<sup>8</sup>. Suryanamaskar is an integral part of practice of yoga. It is a sequence of yogic postures or asanas which are maintained in a steady state and adopted for a brief duration of time while co-ordinating these postures with breathing. It may be considered a warm-up as well as relaxation technique. The benefits of suryanamaskar are many, which include exercising almost all the muscles and joints of the body, strengthening them and improving neuromuscular co-ordination. The present study was undertaken to evaluate the effect of suryanamaskar on hand grip strength in 120 newly enrolled healthy volunteers selected randomly from one of the reputed yoga canters in Mumbai. Hand grip strength was measured using hand grip dynamometer in all the subjects before start of the study. Subjects were asked to perform suryanamaskar daily for 30 minutes for 12 weeks. After completion of study period, the hand grip strength was again measured and compared with pre-study data. It was found that the mean hand grip strength before the study was 27.73 with a SD of 6.304. As compared to this, the hand grip strength after the practice of Yoga for 12 weeks showed a considerable increase. The mean hand grip strength was found to be 30.28 with a SD of 6.537. The p value was less than 0.001 which is statistically extremely significant. HGS is influenced by effort, integrity of motor neuronal pathways, muscle bulk and contractility. The increase in muscle strength and can be explained on the basis of stimulation of muscle during the isometric contraction maintained during the steady state of yogic postures. Our findings are consistent with those of fellow investigators showing a similar increase in hand grip strength as a by-product of regular practice of Yoga<sup>4,5</sup>. We conclude that the increase in hand grip strength as was found in our study is probably due to strengthening of the muscular system of the body as a result of practice of certain Asanas involving exercise of

the concerned muscles. Also, there was improved co-ordination while using the hand grip dynamometer which might be another reason for improved hand grip strength score in our subjects.

## CONCLUSION

This study was aimed to evaluate the effect of practice of suryanamaskar on hand grip strength in 120 healthy volunteers in the age group of 20-40 years. We found that the skeletal muscular strength improved after regular practice of suryanamaskar for even a period of only 12 weeks. This was evident from our findings that the hand grip strength measured by a hand grip dynamometer in the volunteers showed significant improvement after 12 weeks practice of suryanamaskar. We, therefore conclude that suryanamaskar has a beneficial effect on the skeletal muscular system. Certain postures maintained as part of suryanamaskar contribute in increasing the strength of the forearm muscles as they are maintained in a state of isometric contraction as part of postures while doing suryanamaskar. The improvement in neuromuscular co-ordination as a result of practice of suryanamaskar seems to be another contributing factor.

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