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Research Article

TO STUDY THE EFFECT OF SURYANAMASKAR V/S SELF STRETCHING ON FLEXIBILITY OF SHOULDER, HIP, SPINE AND ANKLE

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ABSTRACT

Aim: To compare the effect of suryanamaskar v/s self stretching on flexibility of shoulder, hip, spine and ankle.

Objectives: 1. To study the effect of suryanamaskar on flexibility of shoulder, hip, spine and ankle. 2. To study the effect of self stretching on flexibility of shoulder, hip, spine and ankle. 3. To compare the effect of suryanamaskar v/s self stretching on flexibility of shoulder, hip, spine and ankle.

Result: Suryanamaskar and self stretching are effective in improving the flexibility of shoulder, hip, spine and ankle, but Suryanamaskar shows statistically significant difference in improving shoulder and hamstring flexibility compared to self stretching. Also Suryanamaskar does not require any tools or gadgets, limited space is enough to perform them and only a few minutes are necessary to perform a given number of cycles.

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INTRODUCTION

The need of the 21st century isn't just to accomplish medicinal greatness in relieving the patients yet in addition and maybe more significantly to keep individuals from getting to be wiped out. At present, a noteworthy reason for dismalness and mortality is current way of life which incorporates pressure, physical inertia and high fat eating routine prompting obesity. These factors show themselves as way of life ailments, for example, hypertension, diabetes mellitus and coronary diseases. 1 Adaptability is utilized to depict the capacity to move a solitary joint or arrangement of joints easily and effectively through an unlimited agony free ROM. Adaptability is believed to be a vital factor in the counteractive action of damage or reinjury of the musculoskeletal framework, enhance course, enhance ROM, get ready body for progressively energetic activities. 2 Extending alludes to any remedial move intended to protract abbreviated delicate tissues structures there by expanded ROM. There are different methods for stretchings, for example, uninvolved, static, isometric, ballistic, dynamic and so on.

Self extending is utilized to depict any extending activity that is completed autonomously by a subject after directions and supervision by a therapist. 2 Sun greeting, additionally called as Suryanamaskar, sun love for wellbeing, productivity and life span is a piece of Indian conventional yogic practices 3. It

includes pranayam, asana and upasana for example customs.

The sun welcome is performed as a recurrent occasion synchronized with a particular breathing example. Each cycle comprises of 10 stages performed successively in a steady progression. The cycle starts with Stithi or Pranamasana; the supplication pose. It is at that point pursued by the accompanying strides in a succession. Stage 1-Hasta Uttanasana, stage 2-Padahasthasana, Step 3-Dakashinpad Prasarnasan, Step 4-Dwipad Prasarnasan, Step 5-Saashtang Namasakarasan, Step 6-Bhujangasan, Step 7-Parvatasan Step 8-again Dakashinpad Prasarnasan, Step 9-Padahasthasana and Step 10-returning to Stithi. These individual asanas have their very own physical benefits³ for example Stage 0 and 10 in figure 1 incites a condition of contemplation; Step 1 extends thoracic, stomach and intestinal muscles and lifts prana upwards in the body. Stage 2 and 9 kneads the stomach organs, conditions the spinal nerves and moves prana in lower body parts. Stage 4 and 5 tone belly, muscles of thighs and legs. Stage 6 practices the spine and fortifies muscles of arms and legs. Step 7 reinforces the muscles of shoulders, arms and chest. Every one of these stances are orchestrated so that each progression is complimentary to the next. For instance in reverse twisting exchanges with forward bowing. In this way sun greeting turns into a sort of action which includes pretty much all aspects of the body and is considered as a total

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exercise. A significant number of sun greeting specialists additionally trust that regular practice of few cycles, when performed appropriately prompts advancement and reinforcing of pretty much every part of the body 4 Suryanamaskar (SN) is a consecutive mix of yogic stances performed progressively in synchrony with the breath. In spite of the fact that there are various reports on the impact of yoga preparing on aspiratory functions,^{5,6} respiratory pressures,^{7,8} handgrip quality and endurance,⁷⁻¹¹ and cardiovascular parameters,¹²⁻¹⁴ logical writing is lacking on the physiological impacts of SN that is a basic piece of present day yoga preparing. For a long time, there was just a single logical study¹⁵ on this training and even that review was performed on just two subjects. Lately, thinks about have been led by Sinha and colleagues¹⁶ who contemplated vitality cost and cardiorespiratory changes amid the training, just as Bhutkar and associates¹⁷ who directed a pilot ponder on a half year of SN practice on cardiorespiratory wellness parameters. Sinha and partners had presumed that SN is a perfect type of high-impact practice having static, extending and dynamic solid developments including all major joints.¹⁶

In cutting edge way of life a large number of us invest larger part of our energy in doing stationary work prompting decline in physical action thusly bringing about strong snugness, which may cause an obstruction in our ADL's. Thus to keep this adaptability should be enhanced and kept up.

Subsequently the present examination was structured was attempted to assess and discover the powerful strategy for enhancing the flexibility and looking at the equivalent.

Aim

To compare the effect of suryanamaskar v/s self stretching on flexibility of shoulder, hip, spine and ankle.

Objectives

1. To study the effect of suryanamaskar on flexibility of shoulder, hip, spine and ankle.
2. To study the effect of self stretching on flexibility of shoulder, hip, spine and ankle.
3. To compare the effect of suryanamaskar v/s self stretching on flexibility of shoulder, hip, spine and ankle.

METHODOLOGY

Inclusion criteria

Asymptomatic healthy nulliparous urban women of 18 to 25 years of age with Body Mass Index of 18.5 to 27.9 kg/m².⁵⁴

Exclusion criteria

1. Regular exercising, recreational or professional sports playing individuals.
2. Individuals, who were undergoing or had undergone training in balance, strengthening, dance in last 3 months.
3. Individuals with poor flexibility according to Modified Sit and Reach Test grades.
4. Any Musculoskeletal disorder.
5. Any Neurological disorder.
6. Any Cardiovascular or Respiratory disorder.
7. Vestibular dysfunction.

8. Individuals on medications such as sedatives, hypnotics, anxiolytics, antidepressants.
9. Uncorrected visual and auditory impairment.

Study design and the study were approved by the Ethical committee. Purpose and the procedure of the study were explained to the subjects. Subjects were screened using the inclusion and exclusion criteria. Written consent was taken from all the participants.

Screening of the Subjects: Baseline measurements. The height and weight of the subjects were assessed and Body Mass Index was calculated by dividing the weight of the subject [in kilograms (kg)] by the height [in meters (m)] squared:

$$\text{Body Mass Index} = \text{weight (kg)} / [\text{height (m)}]^2$$

Range (kg/m²)

Grade

- <18.5 Underweight
- 18.5 - 22.9 Normal
- 23 - 27.9 Overweight
- 28 - 32.9 Grade 1 Obesity
- 33 - 37.9 Grade 2 Obesity
- 38 and > Grade 3 Obesity

Obesity Grades, Indian Standards

As per the inclusion criteria subjects with Body Mass Index of 18.5 to 27.9 kg/m² were selected and flexibility was assessed

Spine and Hip using Modified Sit and Reach Test

Starting Position: Subjects were made to sit on the floor with the back and head against a wall, legs fully extended, with the bottoms of the feet against the sit-and-reach box. They were then asked to place hands on top of each other, and stretch the arms forward while keeping the head and back against the wall. The distance from the fingertips to the box edge was measured with a measure tape. This represents the zero, or starting point.

Starting position for Modified Sit and Reach Test

Test Position: Subjects were asked to slowly bend and reach forward as far as possible (instructions: move head and back away from the wall), sliding the fingers along the measure tape; and hold the final position for 2 seconds.

Final position for Modified Sit and Reach Test

Score: Total distance reached to the nearest ¼ inch represented the final score. Mean of three readings was considered as the final score. Individuals with poor flexibility according to the ratings were excluded. Range (cm) Rating for women ≤ 35 years of age:

- > 17.9 Excellent
- 16.7 - 17.9 Good
- 16.2 - 16.7 Average
- 15.8 - 16.2 Fair <15.4 Poor

Ankle using ankle flexibility test

Stand facing the wall with face and chest in contact of the wall. Slowly slide your leg away from the wall without raising the heel of the floor to a point you cant extend beyond. Measure the distance between wall and second toe with the measuring tape

Shoulder using shoulder and wrist flexibility tests

Lie prone on the floor with arms fully extended over head. Grasp a yard stick with shoulder width apart. Raise the stick as high as possible. Measure the vertical distance of yardstick from the floor. Measure arm length from acromion process to tip of longest finger.

Score: arm length-vertical score.

Procedure

30 Physiotherapy students voluntarily enrolled in the present study. Subjects in the age group of 18-25 years were randomly assigned into 2 groups of 15 subjects each.

Group A: 15 subjects doing supervised suryanamskar.
Group B: 15 subjects doing supervised self stretching.

Group A: Performed supervised suryanamskar for 5 days a week for 2 weeks.¹

Group B: Performed self stretching of pectoralis major, hamstring, dorsolumbar fascia, tendoachalis.²

Each muscle was stretched 10 times a day for 5 days a week for 2 weeks.

Pre and post parameters of flexibility were taken.

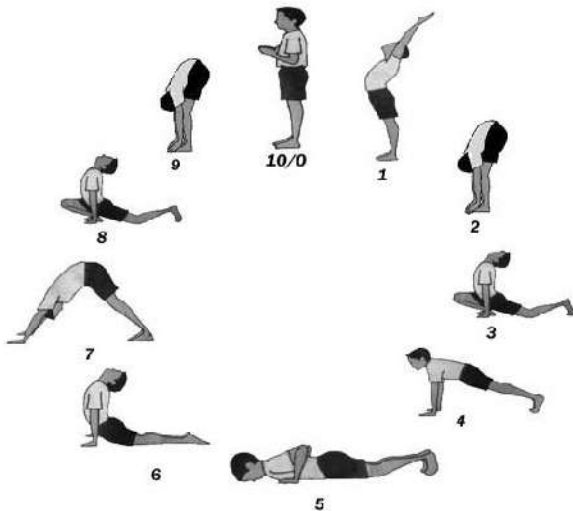


Fig 1 Steps involved in sun salutation. 0/10: Stithi/ Pranamasana, 1: Hasta Uttanasana 2 and 9: Padhastasan, 3 and 8: Dakashinpad Prasarnasan, 4: Dwipad Prasarnasan, 5: Saashtang Namasakarasan, 6: Bhujangasan, 7: Parvatasan

RESULTS AND ANALYSIS

Data Analysis: The data was entered using Microsoft excel 2010 and analysed using Primer of Biostatistics software.

A paired t test was done to compare the pre and post stretch values of group A and group B.

An unpaired t test was done to compare the pre and pre stretch values of group A and group B.

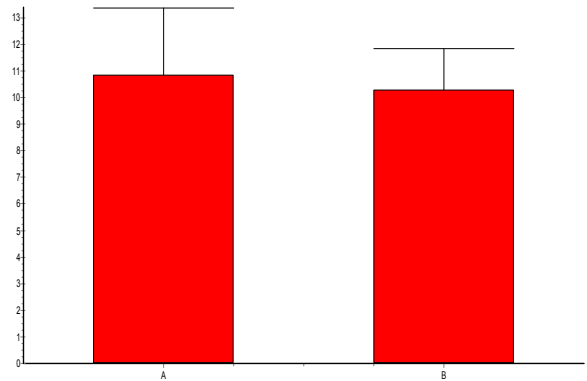
An unpaired t test was done to compare the post stretch values of group A and group B.

P value less than 0.05 was considered as statistically significant.

Graphical representation

Pre suryanamaskar v/s pre self stretching flexibility of shoulder

Table 1	Pre Suryanamaskar	Pre Self stretching
Mean	10.8333	10.2667
Standard Deviation	2.333	1.58

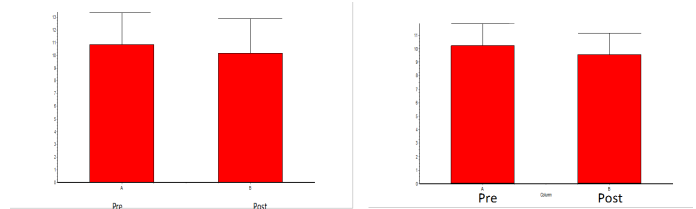


Graph 1

Inference: Flexibility of shoulder was same for both the groups of subjects (p value of 0.4683.)
*The same findings are seen for suryanamaskar and self stretching for hip , spine and ankle flexibility.

Comparison of shoulder flexibility in both the groups

Table 2	Shoulder flexibility			
	Suryanamaskar		Self Stretching	
	Pre	Post	Pre	Post
Mean	10.833	10.2	10.266	9.58
Standard Deviation	2.533	2.684	1.58	1.609



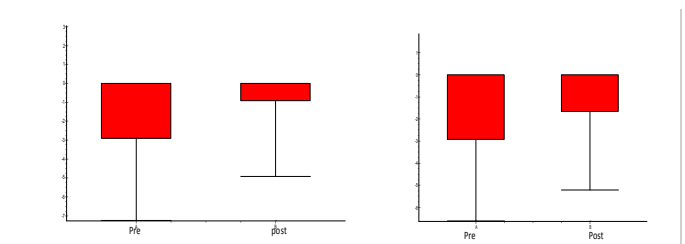
Inference: There was significant increase in shoulder flexibility post suryanamskar. (Pvalue<0.001)

Inference: There was significant increase in shoulder flexibility post self stretching(p=0.0036)

Graph 2

Comparison of hip and spine flexibility in both the groups

Table 3	Hip & Spine flexibility			
	Suryanamaskar		Self Stretching	
	Pre	Post	Pre	Post
Mean	-2.933	-0.933	-2.946	-1.68
Standard Deviation	4.313	3.983	3.667	3.537



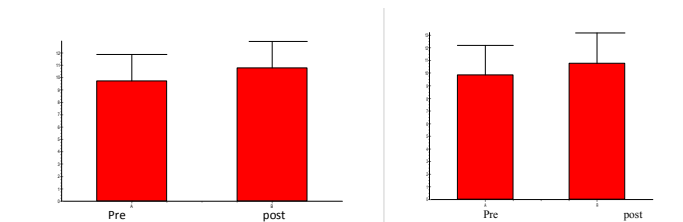
Inference: There was significant increase in hamstring flexibility post suryanamskar (P<0.001)

Inference: There was significant increase in hamstring flexibility post self stretching (p <0.001)

Graph 3

Comparison of ankle flexibility in both the groups

Table 4	Ankle flexibility			
	Suryanamaskar		Self Stretching	
	Pre	Post	Pre	Post
Mean	9.74	10.78	9.873	10.77
Standard Deviation	2.117	2.151	2.319	2.403



Inference : There was significant increase in ankle flexibility post suryanamaskar(p<0.001)

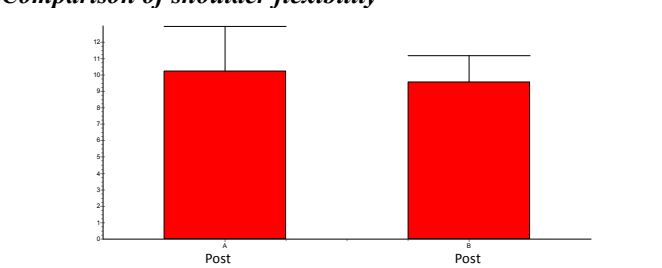
Inference: There was increase in flexibility post stretching.(p<0.001)

Graph 4

Comparison of shoulder, hip and spine and ankle flexibility between both the groups

Table 5	Shoulder flexibility		Hip & Spine flexibility		Ankle flexibility	
	Suryanamaskar	Self Stretching	Suryanamaskar	Self Stretching	Suryanamaskar	Self Stretching
	Mean	10.233	9.58	-0.933	-1.68	10.78
Standard Deviation	2.722	1.609	3.983	3.537	2.151	2.403

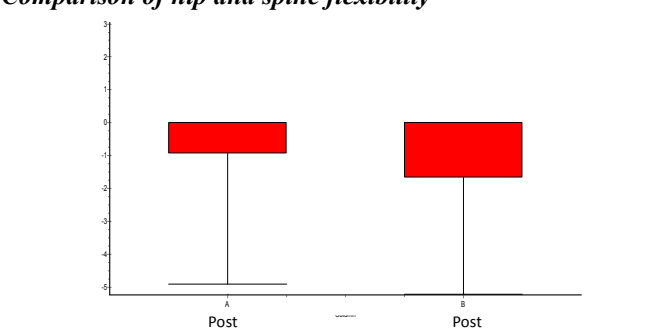
Comparison of shoulder flexibility



Inference: suryanamaskar and self stretching both are effective in improving shoulder flexibility but suryanamaskar is more effective than self stretching. (p=0.4307)

Graph 5

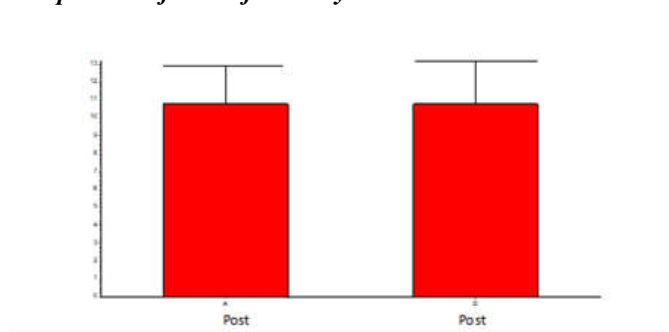
Comparison of hip and spine flexibility



Inference: suryanamaskar and self stretching both are effective in improving hamstring flexibility but suryanamaskar is more effective than self stretching.(P=0.5915)

Graph 6

Comparison of ankle flexibility



Graph 7

Inference: The above graph show that both are equally effective

DISCUSSIONS

As stated by carolyn kisner, when a muscle is stretched the stretched force is transmitted to the muscle tissues [endomysium and perimysium] in and around the fibres. It is hypothesized that molecular interactions links these noncontractile elements to the contractile unit of muscle. During stretch both longitudinal and lateral force transduction occurs. When initial lengthening occurs in the series elastic (connective tissue) component, tension rises sharply. After a point, there is mechanical disruption (influenced by mechanical and neural changes) of the cross bridges as the filaments slides apart, leading to abrupt lengthening of sarcomere.

Also when a stretch force is applied to a muscle tendon unit either quick or over a prolonged period of time, the primary and secondary afferent of intrafusal muscle fibres senses the length changes and activate extrafusal muscle fibres via alpha motor neuron in the spinal cord, thus activating the stretch reflex and increasing tension in the muscle being stretched.² During sun salutation, muscles of the entire body experience stretch and pressure alternately and therefore it is said to give more benefits in short duration of time^{1,4,18}

In suryanamaskar, increase in the flexibility of shoulder occurs as can be seen in posture 2 there is extension of spine and shoulder occurs and actively trying to maintain that postures leads to stretching of the shoulder muscles and thus improves the flexibility. Similarly spine and hip flexibility increases as in the posture 2 and 9 there is flexion of spine and hip maintaining this position leads to stretching of dorsolumbar fascia and hamstring muscle. Also there is increase in ankle flexibility, as in posture 3,7 and 8 (inverted v posture) there is dorsiflexion along with knee extension and maintaining this position leads to stretching of calf muscles and improves flexibility.

CONCLUSION

Results of the present study indicate that there is increase in shoulder, hip, spine, and ankle flexibility with suryanamaskar as well as with self stretching. Both are effective in improving the flexibility of shoulder, hip, spine and ankle, but suryanamaskar shows statistically significant difference in improving shoulder and hamstring flexibility compared to self stretching. Also Sun salutation does not require any tools or gadgets, limited space is enough to perform them and only a few minutes are

necessary to perform a given number of cycles.

Limitation

- Small sample size.
- The study was carried out for a two weeks and hence long term effects were not considered.
- Study was carried out only on females.
- Time taken for performing the exercise is not considered.
- The study was carried out on young population.
- Vitals were not considered.

Recommendations

- Sample size should be larger for accurate results.
- Study can be carried out for a longer period so that the long lasting effects of improvement can be noted.
- Studies can be carried out on males.
- Time taken for performing the exercises should be noted.
- The studies can be carried out on elderly population.
- Vitals should be considered.

Clinical Implication

It is observed that Self stretching of selective muscle of a particular joint helps to improve flexibility for one movement of that joint. Where as Suryanamaskar is a series of 10 continuous asanas, single asana of suryanamaskar helps to improves flexibility of different joints of a body at one time. In suryanamaskar not only the musculoskeletal system but also all the other systems of body like cardio respiratory, Gastro intestinal, CNS get targeted. Also the time taken for performing the suryanamaskar is less compared to self stretching of number of muscles of whole body.

So, it can be collectively suggested that suryanamaskar can be preferred over self stretching for improving the flexibility of whole body muscles in healthy individuals.

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