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## A study on effect of Yogasanas on flexibility, body mass index, resting heart rate, systolic and diastolic blood pressure and perceive well-being

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### Abstract

**Aim:** The purpose of this research was to determine the effects of 10 weeks, yoga practice (Surya Namaskara) on flexibility, resting heart rate, blood pressure, BMI and perceive the well-being in Delhi University Boys.

**Subjects and methods:** The method of this study was experimental research and sample were 30 male athletes, of IGIPESH (18-22 aged). Thirty subjects were randomized in two groups, experimental group (n=15) and control group (n=15). Experimental group accomplished yoga practices program for 10 weeks, 3 days a week (control group had no yoga practice).

**Results:** Paired sample T-test was used to analyze the data of the study by use of SPSS software. Result showed that 10 weeks Surya Namaskara significantly decreased BMI and increased flexibility, but had no effect on resting heart rate, blood pressure and perceive well-being in experimental group.

**Conclusion:** Doing 10 weeks Surya Namaskara could decrease BMI and had positive effect on flexibility therefore it is useful exercise to increase flexibility and decrease BMI. While there were no significant changes in resting heart rate and systolic and diastolic blood pressure, or perceived well-being scores in this study, Surya Namaskar exercise may be helpful over a longer period of time in maintaining optimum physical and mental health.

**Keywords:** Surya Namaskara, Flexibility, Body Mass Index, Resting Heart Rate, Blood Pressure.

### 1. Introduction

Yoga is a very ancient discipline. It is recognized as one of the most important and valuable gifts of Indian heritage. Yoga refers to traditional, physical and mental disciplines that originated in India a few thousand years ago. The word is associated with meditative practices in Hinduism, Buddhism and Jainism. Several seals discovered at Indus Valley Civilization (3300-1700 BCE) sites in present day Pakistan depict figures in positions resembling yoga or meditation pose. Recorded history of the Yoga tradition starts with the Yoga Sutra, which is the definitive text on the philosophy of classical yoga. Today the world is looking to yoga to solve the various problem men are facing. Yoga at the highest level attempts to control the mind, [7] Yoga today focuses on purification of the physical body as leading to the purification of the mind and prana or vital energy. It is also believed that living a happy and healthy life on all planes is possible through the unified practice of hatha yoga asanas and pranayams, dharna and dhyana, especially when performed consciously and with awareness, [4] Surya Namaskar is a series of twelve physical postures. It is one of the ancient ways of exercise and more than that it was the lifestyle of the ancient India. The term Surya Namaskara is coined from the two worlds Surya and Namaskar, the meaning of Surya is "the Sun" and Namaskara is the way of "worshiping Gog". Its origins lie in a worship of Surya, the Hindu solar deity. This sequence of movements and poses can be practiced on varying levels of awareness, ranging from that of physical exercise in various styles, to a complete sadhana which incorporates asana, pranayama, mantra and chakra meditation. Surya Namaskara is a type of exercise for endurance, flexibility and strengthen the muscles of whole body, done on the floor without any machine or weights. This sequence of movements and poses can be practiced on varying levels of awareness, ranging from that of physical exercise in various styles, to a complete sadhana which incorporates asana, pranayama, mantra and chakra meditation. The physical base of the practice links together twelve asanas in a dynamically performed series. These asanas are

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ordered so that they alternately stretch the spine backwards and forwards. When performed in the usual way, each asana is moved into with alternate inhalation and exhalation (except for the sixth asana where the breath is held in external suspension). A full round of Surya Namaskara is considered to be two sets of the twelve poses with a change in the second set by moving the opposite leg first through the series. The simulated push-up movement and upper body weight bearing positions in the series may help to develop muscular strength and endurance in the pectoral, triceps, as well as the muscles of the trunk. The series gives such a profound stretch to the body that it is considered to be a complete yoga practice by itself,<sup>[4]</sup> The studies reviewed illustrate that there are many physical, physiological, and psychological benefits to participating yoga and yoga related mind-body interventions. Regular practice of a variety of yoga techniques have been shown to lower BMI, heart rate and blood pressure in various populations,<sup>[6, 8, 10]</sup> These studies show that regardless of the current health status, mind-body interventions can be successful in improving the health and wellness status of a variety of individuals. The results are encouraging as they show alternate ways to improve overall physical health and mental well-being which may be considered as a compliment to traditional medical interventions. Lee *et al.* (2004) studied the health effects associated with participation in a community-based mind-body training program. The results showed that at baseline, new participants to the mind-body training program reported lower health-related quality of life in 7 out of 8 domains as compared to other U.S. community-based populations. However, after three months of training, the mind-body participants reported significant improvements in all domains of health-related quality of life, fewer depressive symptoms, less trait anxiety, and greater self-efficacy. Participants who had reported lower health-related quality of life at baseline reported moderate improvements after the intervention,<sup>[5]</sup> Flegal *et al.* (1998) conducted a study to determine the adherence to mind-body intervention in a randomized trial. One hundred and thirty five healthy men and women, between 65-85 years of age, were enrolled in this six month study. Health-related quality of life was measured with the SF36. The yoga group showed significant improvement in the self-rated measures of physical functioning and general health as scored by the SF-36 compared to the exercise and control groups,<sup>[2]</sup> The purpose of the study was to determine the effect of 10 weeks, Surya Namaskara yoga practice on flexibility, BMI, resting heart rate, blood pressure and perceive the well-being. It was hypothesized that 10 weeks Surya Namaskara yoga practice will significantly decrease resting heart rate, systolic and diastolic blood pressure, BMI and will significantly improve the flexibility and well-being.

### Method

Prior to testing, the subjects were weighed and their height measured using an electronic body scale tool made in Satrap co-Iran. A polar heart monitor was used to measure resting heart rate. The researcher, using a standard sphygmomanometer and stethoscope, manually measured the subjects' resting blood pressure during the pre and post study testing. The SF-36v2 along with U.S. population norms were used to measure perceived well-being,<sup>[13]</sup> The SF-36v2 includes one multi-item scale that assesses eight health domains, and provides psychometrically-based physical component summary (PCS) and mental component summary (MCS) scores. SF-36v2 assesses eight health concepts:

✓ Limitations in physical activities because of health

problems (PF).

- ✓ Limitations in usual role activities because of physical health problems (RP).
- ✓ Bodily pain (BP).
- ✓ General health perceptions (GH).
- ✓ Vitality (energy and fatigue) (V).
- ✓ Limitations in social activities because of physical or emotional problems (SF).
- ✓ Limitations in usual role activities because of emotional problems (RE).
- ✓ General mental health (psychological distress and well-being) (MH).

Evidence of construct validity and reliability is acceptable on the variables of age, gender and socio-economic class,<sup>[13]</sup>

### Intervention Procedures

After the pre-test, the yoga group was given one, 1 hour session of instruction to learn the basic postures of Surya Namaskara (Figures 1). Subjects were instructed to following their natural breath. Following the natural breath is done by paying attention to each inhalation and exhalation for the period of time indicated. When performing the routine, subjects were instructed to hold each posture for the duration of one inhalation or exhalation depending on the movement being performed.

15 Subjects participated in 10 weeks yoga training program, every week had 3 sessions and every session lasted 30 minutes. Each session started by warm up, followed by 10 minutes Surya Namaskara and finished by a 5 minute rest period of lying on their backs in shavasana (figure 2). Subjects of control group were requested neither to do yoga exercise nor participate in regular mind-body related classes during the 10 weeks of the study.

### Sample

30 healthy male athletes (18-22 years old) from IGIPSS were selected as subjects for this study. Subjects are randomly assigned to either control (n=15) or yoga group (n=15) using simple random sampling technique. Volunteers were excluded if they had participated in regular mind-body related classes in the past or if were diagnosed as hypertensive. Each participant read and completed a informed consent form and completed the American Heart Association and American College of Sports Medicine Pre Participation Screening Questionnaire prior to the onset of the study. Both groups were given an oral and written overview of the study and all participants agreed to participate in the study regardless of being selected for the yoga or control group.

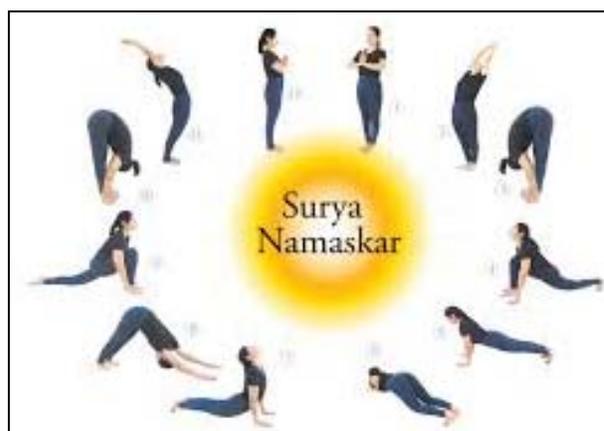


Fig 1: Twelve Physical Postures Surya Namaskara

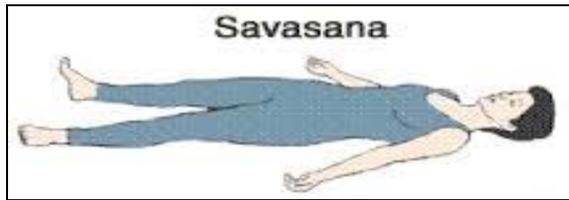


Fig 2: Spine Posture (Shavasana)

### Analysis of Data

Descriptive Statistics were obtained on all measures. An independent t-test was conducted to ensure that the groups did not differ significantly at the onset of the study. Inferential

statistics with paired sample t-test assessed differences due to the effect of Surya Namaskara yoga practice on BMI, resting heart rate, systolic and diastolic blood pressure and well-being. SPSS 18 was used for all the analyses with  $\alpha=0.05$  used as the level of significance.

### Results

Analyzing the results of data showed that there is no significant difference in the resting heart rate, systolic, diastolic blood pressure and well-being in post-test as compared to pre-test but there is a significant difference in the BMI and flexibility in the post-test as compared to the pre-test in response to yoga training.

Table 1: Change in Physiological Measures (Mean+SD)

	Control Group(pre)	Control Group(post)	T	Sig	Yoga group(pre)	Yoga group(post)	T	Sig
RHR	71.20±2.007	71.0±0.845	0.587	0.567	72.07±0.884	71.87±1.13	1.146	0.271
SBP	128.4±5.040	128.0±1.648	0.435	0.670	125.47±2.031	125.33±2.743	0.459	0.653
DBP	72±0.756	71.87±1.356	0.807	0.433	73.47±4.596	72.53±4.375	0.995	0.337
BMI	26.28±0.153	26.35±0.552	1.305	0.213	26.05±0.389	25.13±0.183	8.953	0.00*
FLX	13.60±0.152	13.63±0.551	1.69	0.114	13.68±0.179	15.14±0.145	12.325	0.00*

Table 1: Change in SF-36 Measures (Mean+SD)

	Control Group(pre)	Control Group(post)	T	Sig	Yoga group(pre)	Yoga group(post)	T	Sig
PF	51.93±4.40	52.47±4.31	-1.417	0.178	54.93±1.22	55.06±1.58	-0.564	0.582
RP	55.27±1.43	54.93±1.67	1.581	0.136	54.93±1.56	56.0±1.56	-0.619	0.546
BP	56.40±3.27	56.66±3.48	0.939	0.364	53.27±4.48	53.27±4.27	-0.725	0.481
GH	51.80±4.31	52.06±4.60	-0.899	0.384	53.07±3.94	53.40±4.1	-1.234	0.238
V	54.20±4.30	54.40±4.03	0.642	0.531	51.80±3.29	52.0±3.50	-1.146	0.271
RE	51.28±3.07	50.92±3.1	1.439	0.174	52.42±3.20	52.28±2.75	0.563	0.583
SF	52.20±4.24	51.80±4.52	1.572	0.138	52.86±3.54	53.26±2.46	-0.823	0.424
MH	52.80±2.93	52.93±2.89	-0.695	0.499	50.66±3.35	51.06±2.65	-0.929	0.373

### Conclusion

Surya Namaskara has advantages and no side effects. In fact, each of the 12 postures of Surya Namaskara renders the body suppleness and strength coupled with mental peace. Moreover, you can also cure many ailments by performing the well-coordinated movements of Surya Namaskar.

The results of present day study show that there is no significant change in RHR, SBP and DBP and perceive well-being, so the researcher could not reject  $H_0$  and related hypothesis of these variables are not accepted. Also significant difference in BMI and Flexibility was observed in post-test as compared to pre-test in response to yoga practice, hence  $H_0$  is rejected, and therefore Surya Namaskar exercise may decrease BMI and increase flexibility during 10 weeks. On the other hand mind-body interventions have found significant changes in resting heart rate and blood pressure, [6, 8, 10] as well as perceive well-being in subjects with hypertension and other health issues, [11, 5] Results of present study supports findings of Kristine (2008) and Sivansankara (2006) in case of BMI and is not compatible with results of Talles (2004), Mc Caffrey (2005), Wang (2004), lee (2004) and Smith (2001) in case of HR, SBP, DBP and health related quality of life.

It is fair to say that the participants in this study had normal baseline measurements for most of the variables; it is not surprising that 'normal' does not become 'more normal'. While there were no significant changes in resting heart rate and systolic and diastolic blood pressure, or perceived well-being scores in this study. Surya Namaskar exercise may be helpful over a longer period of time in maintaining optimum physical and mental health.

The lack of improvement in the SF-36 scores could be attributed to the fact that all participants were basically active, healthy individuals at the onset of the study. The fact that the median scores for all categories measured near to or above the U.S. population norms for the SF-36 at the onset of the study, it is fair to say the group as a whole had an above average sense of perceive well-being. While there may have been subtle improvements in various categories, the SF-36 was not able to detect this.

With increasingly busy schedule and lack of available time during the day to study, work, exercise and socialize, perhaps wellness centers and recreational venues might offer classes on the Surya Namaskara series, making these seemingly beneficial and self-directed techniques available to the community at large.

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