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# EFFECT OF RHYTHMIC EXERCISE AND SURYA NAMASKAR TRAINING ON STUDENTS EYE-HAND COORDINATION AND FLEXIBILITY

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## ABSTRACT

Surya Namaskara is a well-known and common traditional yoga posture in India. It is derived from the Sanskrit name Surya, which also means "sun salutations," and the word Namaskara. It involves the practise of twelve different physical postures, each of which alternates between forward-bending and backward-bending positions. The purpose of this article is to investigate the impact that doing Surya Namaskara has on the flexibility of high school athletes. This research was carried out with the intention of determining whether or not the practise of Surya Namaskara had any impact on the flexibility of athletes competing at the high school level. The lessons were drawn from a variety of different schools in the Varanasi area. The people that were chosen for the study were split into two groups at random: a control group and an experimental group. This helped the researchers reach their goal for the study. The control group did not take part in any extra training other than the ordinary routine, whereas the experimental group practised Surya Namaskara for a period of eight weeks and five days. As a kind of intervention, the researchers had participants practise Surya Namaskar for a total of eight weeks and five days. The pre-test, post-test design of the groups was used to carry out the research for this study. According to the findings of this research project, the Surya Namaskar yoga pose significantly improved the flexibility of high school athletes. This study highlights that not only has there been a considerable increase in the flexibility of high school athletes, but also that there has been a significant difference in the flexibility of experimental groups compared to control groups.

***Keywords:*** *Surya Namaskara, flexibility, school level athletes*

## INTRODUCTION

A classic Indian yogic practise called Surya Namaskara, often known as the sun salutation, is a way of expressing thanks to the sun. It is derived from the Sanskrit name Surya, which in this context refers to the sun. Namaskara is the Sanskrit word for greetings. Because the sun is a sign of spiritual consciousness and because it was worshipped on a daily basis in ancient times, the ceremony is traditionally performed in the early morning hours while facing the rising sun. It consists of a sequence of twelve different physical postures, each of which alternates between forward bending and backward bending, as well as regulated breathing and relaxation techniques. It aids in the reduction of stiffness, revitalises the body, refreshes the mind, and cleanses energy pathways that have been blocked (cited in Chutia, changmai, Thapa and Gogoi,

2016). Because of its ability to assist an individual on all levels—including the physical level, the physiological level, and the psychological level—Surya Namaskara may be considered a full kind of yogic practise (cited in Sisodia and Singh, 2014). One of the most effective techniques to increase flexibility is to perform Surya Namaskara regularly. There is still a great deal of research that has to be carried out before we can determine the influence that Surya Namaskara has on the many physical and physiological factors. One of the yogic practises known as Surya Namaskara is one that has been shown to have a beneficial effect on a person's flexibility.

The practise of Surya Namaskara, which is intended to be a kind of physical training, has a significant emphasis on flexibility. The practise of Surya Namaskara on a consistent basis helps to improve a person's muscles' capacity for stretching without causing any injury. The capacity to move one's joints through their full range of motion without putting undue stress on those joints is what flexibility refers to (cited in Sisodia, 2017). The ability to adapt successfully to shifting conditions is what flexibility entails, as defined by Mandelbaum (1978). According to this definition, flexibility is connected to not one but two different types of change: first, there are shifting conditions, and second, there is a reaction to these shifting conditions that entails a shift in some state or activity (cited in Jonsson, 2007). The term flexibility comes from the Latin word flexure, which means to bend, and flexibly, which means flexible. Flexibility may be described as the "capacity to be bent." Flexibility is an important part of health-related fitness, and a lack of flexibility can lead to a variety of functional problems or disorders. Lack of flexibility has been linked to a variety of health issues, including poor posture, compression of peripheral nerves, back discomfort, and many more. An individual who possesses high levels of flexibility is able to move with great ease and has a reduced risk of injury when moving. (Miller, 2006)

The Sun Salutation, also known as Surya Namaskar, is an ancient Indian practise that consists of a sequence of physical postures combined with controlled breathing and the intention of achieving a variety of benefits on several levels, including the physical, the mental, and the spiritual. In the early hours of the morning, while facing east and maintaining a calm state of mind, one performs the prayer known as "Surya namaskar" to the god known in Sanskrit as "Lord Sun." In addition to a series of physical postures, the term "surya namaskar" also has a number of unique spiritual implications. The Surya Namaskar is an elegant combination of twelve different yoga postures that is followed by controlled breathing and a period of rest.

The scriptures state that if Surya namaskar is practised correctly, it does not put pressure on the body nor does it result in damage. When done first thing in the morning, it loosens any stiffness in the body, refreshes the mind, and cleans the subtle energy pathways. Even though the Surya namaskar has been praised to a great extent in many religions, not a lot of study has been done to understand the advantages of doing it.

It was hypothesised in a previous research project that the yoga move known as Surya Namaskar, which incorporates both static stretching and a slow dynamic component of exercise, could be the perfect aerobic activity because it places the optimal amount of stress on the cardiovascular and respiratory systems. In a later research, the cardio-respiratory and metabolic effects of performing four rounds of Surya namaskar—the normal amount that practitioners do—were analysed to see whether or not the practise has the potential to be used as a tool for training and weight reduction. During Rounds 2 and 3, the participants exercised at a heart rate that was 84% of the age-predicted maximum heart rate (HRmax), and during Round 4, they exercised at a heart rate that was 90% of the HRmax. The intensity was kept at an average of 80% of the participant's maximum heart rate during all four rounds, which was high enough to provide a

cardiorespiratory training effect. Consumption of oxygen during each cycle averaged 26 millilitres per kilogramme per minute, which led to an expenditure of 230 kilocalories of energy during a session lasting 30 minutes for an individual weighing 60 kilogrammes.

These findings provide credence to the use of Surya namaskar as a beneficial physical exercise within the parameters advised for such activities by the American College of Sports Medicine, namely, 50% to 80% of one's maximum VO2 and 60% to 90% of one's heart rate reserve. Recent research conducted by Bhavanani and colleagues compared the physiological consequences of six months of training using either the fast or slow variations. The findings suggested that performing Surya namaskar has beneficial effects on one's physiology, as evidenced by an improvement in pulmonary functions, respiratory pressures, hand grip strength and endurance, and resting cardiovascular parameters. These findings were presented in the form of graphs. It also demonstrated the differences that occur between performing Surya namaskar in a slow manner as opposed to a fast manner. The study came to the conclusion that the effects of the fast version are comparable to those of physical aerobic exercises, whereas the effects of the slow version are comparable to those of yoga training.

In contrast to the two studies that were conducted on young people and focused on the cardiorespiratory and metabolic effects of doing Surya Namaskar, a single report was conducted on youngsters ranging in age from 8 to 14 years old to investigate the effects of the practise. After practising Surya namaskar, the researchers found that the participants' Systolic Blood Pressure, Peak Expiratory Flow Rate, and Forced Vital Capacity all increased considerably, whilst the participants' Respiratory Rate, Heart Rate, and Diastolic Blood Pressure all fell dramatically.

A child's academic success is determined by a number of factors, including their physical health, the amount of rest they get, their ability to pay attention in class, and their overall cognitive capacity. While previous research has examined Surya Namaskar as a useful form of physical activity and earlier research has suggested that physical exercise can improve executive functions in school children, the purpose of the present study is to evaluate the influence that Surya Namaskar has on attention span in school children. This was accomplished by designing the study with the intention of determining whether or not Surya Namaskar has an effect on attention span in school children..

## OBJECTIVES

To find out the effect of Surya Namaskara on flexibility ofschool level athletes.

To study rhythmic exercise and surya namaskar training.

## RESEARCH METHODOLOGY

The approach of experimental designs was utilised in the current investigation. The research was carried out utilising a design consisting of a group pre-test and post-test. There were a total of four groups, including two experimental groups and two control groups. Each group consisted of 35 athletes at the school level. The control group did not take part in any extra training other than the ordinary routine, whereas the experimental group practised Surya Namaskara for a period of eight weeks and five days. The sit and reach test was used to evaluate each of the four groups' flexibility both before (in the pre-test) and after (in the post-test) the therapy.

**Selection of Subject**

For the aim of the study, a total of one hundred and forty (male and female) high school athletes from a variety of schools were chosen. The subjects were randomly separated into four groups: an experimental group consisting of males, a control group consisting of males, an experimental group consisting of females, and a control group (female).

**Selection of Variables**

The variables sun salutation (Surya Namaskara) and flexibility were chosen to fulfil the objectives of the current research project, and they were assigned the roles of independent and dependent variable, respectively.

**Criterion Measures**

The sit and reach test was used to evaluate flexibility, and the results were reported in centimeters.

**Procedure of data collection**

A number of different school administrations were contacted and authorization to carry out the experiment was requested before it could be carried out. The entire experiment was broken up into three parts: a pre-treatment phase, a treatment phase (during which participants participated in eight weeks and five days of Surya Namaskara training sessions), and a post-treatment phase. Flexibility was evaluated using a sit-and-reach test during the pre-treatment phase (flexibility was measured by sit and reach test).

**Data analysis and interpretation**

The statistical methods of mean, standard deviation, and analysis of covariance (ANCOVA) were utilised in order to perform data analysis and make relevant conclusions relating to the purpose of the current study. In order to facilitate the interpretation of the results, the threshold was fixed at 0.05.

**Part A- Distribution of the Data**

**Table 1:** Distribution of Sample according to group

| **Group** | **Number of students** |
|---|---|
| Experimental (Male) | 35 |
| Control (Male) | 35 |
| Experimental (Female) | 35 |
| Control (Female) | 35 |
| Total | 140 |

**Part – B Statistical Analysis of Data**

In this section, we will examine and evaluate the data that was gathered for this study by making use of the many research tools available. In order to conduct an analysis of the data, mean and standard deviation values were obtained.

**Table 2: Mean pre-test, post-test scores of Experimental and Control groups and ANCOVA in respect to flexibility of students. N=140**

| Groups | Pre-test | Post-test | Source of variance | Df | SSx | SSy | SSyx | MSSy.x | Fy.x |
|---|---|---|---|---|---|---|---|---|---|
| Experimental | 35.32 | 37.57 | Among | 3 | 65.40 | 266.14 | 222.16 | 74.05 | 40.7 |
| Control | 35.75 | 35.54 | Within | 135 | 2025.22 | 1836.4 | 245.57 | 1.819 | |

Where-

Df- Degree of freedom, SSx- Sum of squares for x

SSy- Sum of squares for y, SSxy- Adjusted sum of squares

MSSyx – Mean square variance

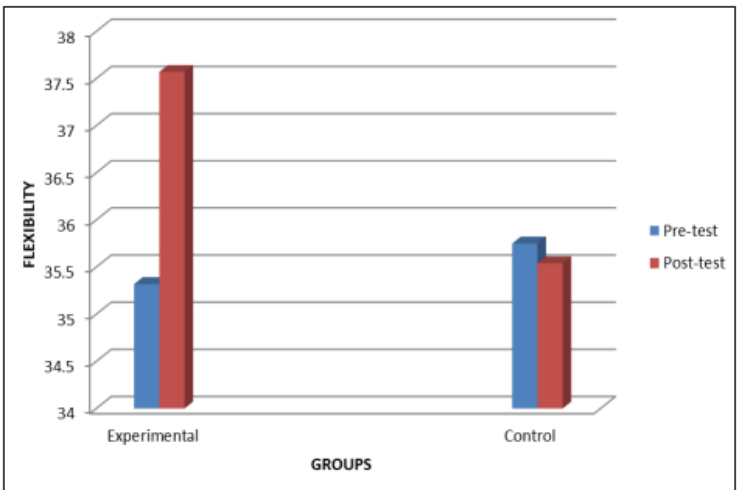


**Fig 1: Graphical representation of Mean Flexibility (pre and post- test) of experimental and control group**

**Result and Discussion**

The objective of the study was to find out the effect of Surya Namaskara on flexibility of school level athletes. From the table 2, it is clear that calculated value 40.7 is much greater than the table value 2.66 at 0.05 levels. Therefore, this obtained value is significant at 0.05 levels and thus $H_0$ is rejected and corresponding hypothesis is accepted and it may be said that there is significant difference between mean

scores of the pre-test and post-test. The study also showedthat there was a significant difference in improving flexibility of the students. The result of study also indicated that experimental group had significantly improved the performance of sit and reach flexibility when compared to control group. It also indicated that there was significant difference exists between the pre-test and post-test means of experimental and control group on sit and reach flexibility. The result of this study is supported by other research findings. Sethu (2016) determined that Surya Namaskara practices for a period of six weeks of five days per week was significant in improvement of ankle and wrist flexibility and also concluded that there was a significant difference exists between experimental and control groups on ankle and wrist flexibility. Singh (2016) reported significant difference between pre and post-test flexibility of Cricket players ($t=6.713$, $p<0.05$) and also concluded that Surya Namaskara training may be effective for the improvement of flexibility ofCricket players. Deshmukh, Chincholkar, Sutar and Ghodey (2018) [2] studied the effects between Pilates and Surya Namaskara on flexibility in women having sedentary lifestyle using Sit and Reach test and Shoulder and Wrist test and found significant difference in flexibility in pre and post values in Pilates and Surya Namaskara, but when comparison was made between two groups Surya Namaskara training is effective to observe improvising flexibility in sedentary females.

## CONCLUSION

The findings of the research reveal that there was a substantial improvement discovered in flexibility as a consequence of frequent practise of Surya Namaskara in experimental groups. These findings are based on the findings of the outcomes of the study. It is possible to draw the conclusion that the Surya Namaskara has been successful for athletes competing at the school level in terms of improving their flexibility. Additionally, regular practise of the Surya Namaskara helps athletes improve the strength of their leg muscles and other muscle groups.

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