

The Effect of Suraya Namaskar and Moderate Exercise on Attention, Emotional Maturity and Psychological Well-Being: A Comparative Study

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Abstract

Original Research Article

Objective: To explore the therapeutic effects of Surya Namaskar on Attention, Emotional Maturity and Psychological Well-Being among medical students. **Background:** Sun salutation (Surya Namaskar) is a comprehensive Yoga technique which incorporates physical activity, breath regulation, relaxation and awareness. Apart from improving physical stamina and endurance, Surya Namaskar has been shown to influence an individual's perception and performance. Hence, the present study has been designed to measure the performance of medical students in a digit letter substitution task following the practice of Surya Namaskar compared to physical exercise. **Methods:** 250 medical students between the age group of 18 to 24 years, belonging to both genders were screened and 64 healthy volunteers were selected. This was the pre and post study and was conducted on 64 healthy volunteers. They were randomly allocated to 2 groups with 32 students each (Experimental group and Control group). Subjects were assessed at the beginning and end of 30 days of intervention (Surya Namaskar or Physical Exercise) using a Digit Letter Substitution Task. **Results:** After 30 days of practice, there was improvement in attention, emotional maturity and psychological well-being of the medical students. The value of t-test for attention, Emotional Maturity and Psychological Well-Being is significant at 0.01 level of confidence. The data were normally distributed and the baseline data across the groups were not statistically different ($p > .05$). The pre-post data within each group was analysed using a paired t-test. There was a significant increase in number of letters substituted per digits in both yoga ($p < 0.01$) as well as control group ($p < 0.01$). The difference between the groups was not statistically significant ($p > .05$). **Conclusion:** The result of the study shows significant effect of Surya Namaskar in improving the levels of Attention, Emotional Maturity and Psychological Well-Being, If Physical activity given regularly in a structured manner followed by supine rest.

Keywords: Yoga; Surya Namaskar; Physical exercise; Attention, Emotional Maturity and Psychological Well-Being.

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INTRODUCTION

For most of us, today's lifestyle accentuates mental tensions, worries and seemingly insoluble problems at many levels, such as personal inter-relationships, economics and even geopolitical threats of war and destruction. At the same time the amount of sedentary or semi-sedentary work is increasing due to increase in technology and labour saving devices. This has led to a situation in which mental and physical ill health is increasing. Without an antidote there seems to be a little hope [1].

Sun salutation (Surya Namaskar) is an ancient Indian method of offering prayers to the rising Sun in the morning along with a series of physical postures with regulated breathing aiming at range of physical, mental and spiritual benefits. Facing east, in the early

hours of morning, one standing with serene mind offers prayer to Lord Sun (Surya in Sanskrit) with Surya Namaskar. Along with physical postures, Surya Namaskar has specific spiritual connotations attached to it. Surya Namaskar is a graceful combined sequence of twelve positions along with regulated breathing and relaxation.

The symptoms of emotional immaturity include temper tantrums, low frustration tolerance, oversensitivity, inability to take criticism, unreasonable jealousy, unwillingness to forgive, inappropriate dependence, e.g. relying on someone when it is preferable to be self-reliant, indecisive, demanding immediate attention or gratification and being unable to wait for anything, selfishness, low self-esteem and insensitivity to the feelings of others.

According to the scriptures, if performed correctly, Surya namaskar does not strain or cause injury. If performed in the morning, it relieves stiffness, revitalizes the body, refreshes the mind and purifies subtle energy channels [1]. Though the greatness of Surya namaskar has been described in scriptures extensively, not much research has been done to understand its benefits.

Psychological ill-being is related to discontentment, dissatisfaction, frustration with other psychological problems. The life, to such persons, may seem unhappy, insecure and without meaning and they may experience negative affect and psychological conflict. Physical and mental cleansing and strengthening is one of yoga's most important achievements [2].

In an earlier study, it was speculated that Surya namaskar can be an ideal aerobic exercise as it involves both static stretching and slow dynamic component of exercise with optimal stress on the cardiorespiratory system [3]. A later study assessed the cardio-respiratory and metabolic responses of four rounds of Surya namaskar, a typical amount performed by practitioners, to determine its potential as a training and weight loss tool. It was found that participants exercised at 80% of age-predicted maximal heart rate (HRmax) during Round 2, 84% during Round 3, and 90% during Round 4. Average intensity during the four rounds was 80% HRmax, sufficient to elicit a cardiorespiratory training effect. Oxygen consumption averaged 26 ml/kg/ min during each round, resulting in an energy expenditure of 230 kcals during a 30 min session for a 60 kg individual [4].

These findings support the use of Surya namaskar as an effective physical activity recommended by the American College of Sports Medicine i.e., 50% to 80 % VO2 Max and 60% to 90 % heart rate reserve as effective physical activity. Recently Bhavanani & Colleagues evaluated the differential physiological effects of 6 months training in the fast and slow versions. The results suggested that Surya namaskar has positive physiological benefits as evidenced by an improvement in pulmonary functions, respiratory pressures, hand grip strength and endurance, and resting cardiovascular parameters. It also demonstrated the differences between Surya namaskar when performed in a slow versus fast manner, concluding that the effects of fast version are similar to physical aerobic exercises, whereas the effects of slow version are similar to those of yoga training [5].

Asanas are special patterns of postures that stabilize the mind and the body through static stretching [6]. Asanas also relax muscular tensions, something that is essential for people today who find this most difficult. In many cases people consider themselves to be relaxed, yet the muscles remain in a state of tension.

Asanas remove these tensions and give the practitioner a real muscular relaxation. By developing control of the body through asana, the mind is controlled [7], and mental tensions are quickly eliminated.

Regular practice of sun salutation regulates pingala nadi (right nostril), whether it is underactive or overactive, thus leading to a balanced energy system at both the mental and physical levels [8].

Surya Namaskara also influences the pineal gland and the hypothalamus, helping to prevent pineal degeneration and calcification [9]. Practice of surya namaskara influences the entire endocrine system [10] and increases will power [11]. Surya Namaskara regulates the breathing process during anxiety, anger, and other strong emotions because the breathing pattern changes, becoming short or rapid or almost ceasing completely, when any kind of sensation or physiological reaction is experienced. Through this practice our breathing pattern can develop a habitual steadiness. The rhythmic breathing sequence within Surya Namaskara gradually increases one's capacity for life. It is a holistic exercise that provides physical health benefits, but also mental or emotional as well as spiritual benefits [12]. Apart from physical health and physiological rest, an improved attentional process and cognitive function determines the scholastic performance in students.

MATERIALS AND METHODS

Subjects

64 subjects selected from 250 students of 1st year MBBS, SMS Medical College, and Jaipur Rajasthan India. Subjects were screened based on the inclusion and exclusion criteria and the selected 64 subjects were randomly allocated to two groups i.e., Surya Namaskara and physical exercise. Accordingly, the present study had a sample size of 32 subjects in each group.

Inclusion criteria

Normal healthy students with ages ranging between 18 to 24 years, belonging to both genders. Those motivated to practice Surya Namaskar and should have willingness to volunteer for the trial was included.

Exclusion criteria

Presence of cognitive and /or psychiatric, Neurological disorders based on a clinical examination (which was obtained on request from the authorities of the college). Students with attention related problems were also excluded.

Source of subjects

Students studying 1st year MBBS.SMS Medical College, Jaipur, Rajasthan, India

Design

The present study was a Randomized controlled Trial. 64 students of 1st year MBBS divided into 2 groups with 32 students each (Experimental group and Control group) by random selection using a random number table. The signed informed consent was obtained. Assessments were done at baseline (Day 1) and after 30 days of their respective interventions. Experimental group underwent Surya namaskar for a month. Control group was given routine physical exercises. This was same as the physical exercises given to all the students except the Surya namaskar group.

Variables

Digit-letter substitution task (DLST): This task involves visual scanning, mental flexibility, sustained attention and psychomotor speed of information processing. Digit substitution test has already been standardized for use in Indian population [13].

Subjects were made to sit on the desk (two in a desk with a distance of two meters between them). They were given necessary instructions about the task. The DLST consisted of a worksheet which had 12 rows and 8 columns and randomly digits arranged in rows and columns. The participants were asked to substitute as many target digits as possible in the specified time of 90 seconds. They were instructed to substitute letter by their own choice either in a horizontal, vertical or randomized manner by selecting the particular digit. The total number of substitutions and wrong substitutions are scored. The net score was obtained by

deducting wrong substitutions from the total substitutions attempted [13].

Data extraction

The total number of substitutions and wrong substitutions were scored. The net score was obtained by deducting wrong substitutions from the total substitutions attempted. The scoring was done by the experimenter who was unaware of the names of the subjects to whom the data sheets belonged. This ensured masking of the data while doing the data extraction.

Plan of analysis

Data were analyzed using descriptive as well as inferential statistics. The data were assessed for normality distribution using the Shapiro-wilk test (a test of normality). The net scores recorded on Day 30 of Surya namaskar group as well as the Control group were compared with their respective Day 1 values using a paired 't' test. The differences across the groups were assessed using an independent samples 't' test.

Interventions

Surya namaskar has been a traditional Yoga based practice. The Sun has been revered as a deity and worshipped. Surya namaskar is a salutation to this powerful celestial body, around which other planets revolve and take light and heat from it. It is believed that whoever worships Lord Surya is bound to have a dynamic personality, as he rejuvenates life and makes one feel young, agile, brilliant and healthy [1]. The practice of Surya namaskar is detailed below

Name	Description	Duration
Starting Prayer	Hiranmayenapatrena Satyasyapihitammukham Tatvam Pushanapavrunusatyadharmaya Drushtayet Like a lid to a vessel, Oh sun, your golden orb covers the entrance to the truth. Kindly open the entrance, to lead me to the truth.	30 sec.
Loosening exercise	Finger movement, wrist rotation, shoulder rotation, neck rotation, toe movements, ankle movement & rotation, knee movement, butterfly,	10 mins.
Süryanamaskära	Twelve Sun salutations. Step 1: Hasta uttanasan (raised arms pose) Step 2: Padhahastasan (standing forward bend pose) Step 3: Ekapadaprasaranasana (equestrian pose) Step 4: Dwipadaprasaranasana (steep parallel pose) Step 5: Sasankasana (moon pose) Step 6: Sashtanga Namaskar (Salute with 8 limbs pose) Step 7: Bhujangasan (cobra pose) Step 8: Parvatasan (mountain pose) Step 9: Sasankasana (moon pose) Step 10: Ekapadaprasaranasana (equestrian pose) Step 11: Padhastasan (standing forward bend pose) Step 12: Hasta uttanasan (raised arms pose)	12 mins.
DRT	Deep Relaxation Technique	10 mins.
Closing	Om Shantih Shatih Shantih	10 sec.

Physical exercise

Subjects were given physical exercise for same duration of time as that of Surya namaskar which included: Loosening exercises, stretching exercises (forward, backward, sideward), Jogging followed by supine rest.

RESULTS

Two groups (Surya namaskar and Physical Exercise) assessed after thirty days of respective interventions using a digit letter substitution task showed significant improvements. The data were

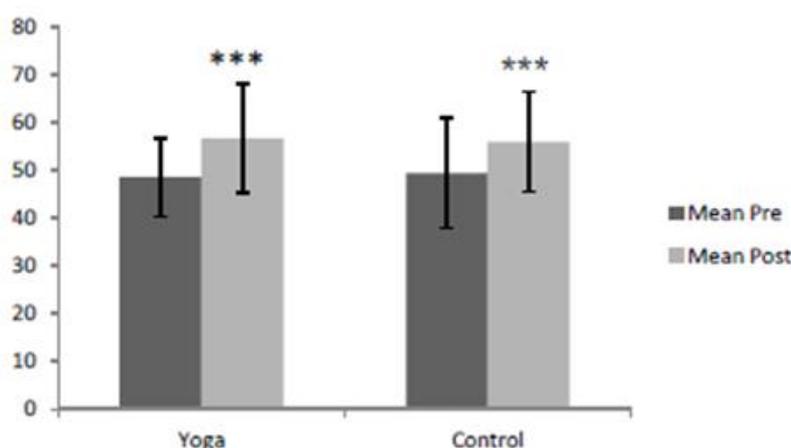
normally distributed and the baseline data across the groups were not statistically different ($p > .05$).

The pre-post data within each group was analyzed using a paired 't' test. There was a significant increase in number of letters substituted per digits in both yoga ($p < .001$) as well as control groups ($p < .001$). The difference between the groups was assessed using an independent samples 't' test which was statistically not significant. The group mean values \pm Standard Deviations are given in Table 1. The same has been graphically represented in Figure 1.

Table-1: Net scores recorded on Day 1 and Day 30 in both Surya namaskar and Control groups. Values are grouping mean $\hat{A} \pm$ SD.

Groups	Day 1 [Mean \pm SD]	Day 30 [Mean \pm SD]	Percentage change
Surya namaskar group	48.59 \pm 8.24	56.71*** \pm 11.34	16.7
Control(Exercise) group	49.47 \pm 11.47	56*** \pm 10.49	13.2

*** $P < .001$, post values compared with the respective pre values using paired 't' test



*** $P < .001$, post values compared with the respective pre values using paired 't' test.

Fig-1: Group Mean $\hat{A} \pm$ SD of Net scores recorded in both Surya namaskar and physical exercise group on Day 1 (pre) and Day 30 (post)

DISCUSSION

64 students of 1st year MBBS, SMS Medical College, Jaipur Rajasthan are randomly divided into two groups (Surya namaskar & control) assessed using a task requiring attention span showed significant improvements after one month of practice of Surya namaskar or regular physical exercise. Earlier studies have attempted to understand the physiological changes following Surya namaskar. They have showed a positive change in energy cost and cardio respiratory performance in young adults. It was speculated that Surya namaskar can be used as an ideal aerobic exercise as it involves both static stretching and slow dynamic component of exercise with optimal stress on the

cardio-respiratory system [3]. Similar observations were made by other researchers. They assessed the cardio-respiratory and metabolic responses to practicing four rounds of Surya namaskar; it was shown that the average intensity during the four rounds was 80% Heart Rate maximum, sufficient to elicit a cardio-respiratory training effect [4].

These findings support the use of Surya namaskar as an effective physical activity recommended by the American College of Sports Medicine i.e., 50% to 80 % VO₂ Max and 60% to 90 % heart rate reserve as effective physical activity. A subsequent study evaluated the differential physiological effects of 6 months training in the fast

and slow versions. Following Surya namaskar there was an improvement in pulmonary function, hand grip strength and endurance, and resting cardiovascular parameters. This study also demonstrated the differences between Surya namaskar training in a slow and fast manner, concluding that the effects of the fast version are similar to physical aerobic exercises, whereas the effects of slow version are similar to those of yoga training [5].

The results of the present study are in line with the earlier report that physical activity influences attentional tasks. Improvement following the practice of Surya namaskar can be attributed to physical activity interspersed with regulated breathing and relaxation as the influence of relaxation on attention span is well documented. The changes seen in the control group (physical exercise followed by supine rest) are similar to that of the experimental group suggesting that structured physical activity of any form followed by supine rest can induce alertful rest. The group which practiced Surya namaskar had 16.7% improvement compared to 13.2% in physical exercise group. However, the difference between the groups was statistically not significant. The marginal better performance in the Surya namaskar group can be attributed to the aspect of Surya namaskar i.e. Physical activity interspersed and slow breathing and relaxation as mentioned earlier.

Yoga is a definite means of physical, mental, emotional and spiritual development, as it improves, strengthens and develops both the physical and mental personality. Everybody wants a fit and efficient body and mind. Remember that the mind and body act and react on each other. Mental ailments cause physical ailments and vice versa [14].

When any type of asana is done, the body becomes flexible and the vital organs function in proper working order. With the help of asanas, memory, concentration, learning power, curiosity to learn and the way of thinking are improved [15] and a balance between our instinctive, emotional and intellectual natures is established. Once a balance is found in these three different natures, then transmissions from the consciousness into the body will be more harmonious, balanced and integrated [16].

Yoga can improve physical and mental health, and promotes well-being [17], and yogic practices can be used as psychophysiological stimuli to increase endogenous secretion of melatonin, which, in turn, might be responsible for improved sense of well-being [18].

Yoga as mind-body intervention helps to modify emotions [19]. Emotions play a very big role in determining the quality of life. Emotional Maturity implies controlling the emotions more willingly than

letting them instruct the quality of life. Some dimensions of emotional maturity are level of self-confidence, self-worth, self-esteem, ability to express and feel love towards self, others and the environment, social adjustment etc. [20]. Psychological Well-Being is not just a moderator variable to our performance, rather it makes life meaningful and purposeful.

Surya Namaskar is useful in achieving concentration. It reduces tension built-up and promotes relaxation of the whole body [21]. Surya Namaskar significantly improves both the physical and cognitive functioning area [22]. It can also control your moods-drive away depression through fast rounds or cool down hyperactivity with slow rounds.

Developing the practice of Surya Namaskara can have repercussions on our whole lifestyle and attitude to life. The exploration of ourselves that we initiate in our daily practice expands in concentric circles out into our daily activity, movement, interaction with people and things, and thus helps to change our lives in a positive and a creative way.

Hence, the present study speculates that physical activity of any form (Surya Namaskar and exercise) followed by supine rest can influence the attention processes, emotional maturity and psychological well-being.

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