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Research Study *Medical research*

Does Suryanamaskar have an effect on Reaction time in young females?

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ABSTRACT

Background

Reaction time is one of the most important component of motor movements. It determines the alertness and attentiveness of a person. Studies have shown improvement in Reaction time by performing yoga asnas and pranayama. Hence, this study was carried out to find out whether Suryanamaskar has an effect on Reaction time over a period of 2 weeks in young females.

Method

This study was examined to find out whether Suryanamaskar has an effect on Reaction time on young females in the age group of 19-25 years. 42 participants were randomly allocated in two groups. Group A performed Suryanamskar 3 times a day for 2 weeks and Group B performed 5 minutes of breathing exercises for 2 weeks. Reaction time was measured pre and post 2 weeks intervention using Deary Liewald Reaction time task software.

Results

There was a significant difference seen in Group A (suryanamaskar) when compared to Group B (p value <0.001). There was a significant difference seen in the pre and post 2 weeks readings of Suryanamaskar Group (p value <0.001).

Conclusion

The results of this study suggests that 2 weeks of Suryanamskar practice showed significant improvement in Reaction time by enhancing central processing ability and improving learning capabilities.

Keywords: Suryanamaskar, Reaction time, Yoga

INTRODUCTION

Suryanamaskar is a combination of yogic postures and series of asnas with good breathing pattern.[1,2,3] It is the salutation of the God Sun and is also a part of yogic postures.[2] The order of asna is such that each asna accompanies the other asna. Muscles of the entire body are stretched during Suryanamaskar, hence gives better benefits in less amount of time. Suryanamskar is beneficial as both asnas and pranayama are performed which improves general health and fitness.[4]It activates each and every cell of the body and improves flexibility, strength and mental calmness.[5]Suryanamaskar provides an excellent warming up exercise, especially in the morning when the body is sluggish, lethargic and stiff.

Reaction time is defined as the interval between the presentation of a stimulus and its appropriate voluntary response.[6] It is one of the major components of motor movements. Singer.et al in 1993 defined reaction time as being composed of

four stages: the start of eye movement, eye movement time, decision time and muscle contraction time. It reflects the speed of the flow of neurophysiological, cognitive and information processes which are created by the action of stimulus on the person's sensory system.[7-9] Reaction time is very important in our everyday lives where being alert and attentive is a must. One has to respond spontaneously to many diverse situations. One has to be mentally attentive to respond to simple tasks for example- telephone ring, doorbell ring orwhistle of a pressure cooker.

Some studies on Yoga have shown to decrease Reaction time over a period of few weeks to few months.[7,8]Suryanamaskar is an easy technique and includes all the forms of asnas with minimum time consumption and hence can be practiced on a daily basis. Hence, keeping the above in mind, this study was carried out to investigate the effect of Suryanamaskar on Reaction time.

MATERIALS AND METHODOLOGY

The study was performed on 42 young females between the age group of 19-25 years. The study was conducted at K.J Somaiya college of Physiotherapy, Mumbai. Ethics committee approval was taken and written informed consent was obtained from all the participants in the study. All the participants were randomly assigned into 2 groups (Group A and Group B) equally using a computer-generated randomization table.

Selection criteria

- Inclusion criteria for the study were young females in the age group of 19-25 years, with corrected eye vision and those willing to participate.
- Exclusion criteria were those who were unable to perform Suryanamaskar due to Musculoskeletal, Neurological or Cardiovascular condition or who were performing any form of exercises.

PROCEDURE

In both the groups, Reaction time was measured using Deary Liewald Reaction time task software.[10] This software runs on a computer screen where the participants had to press the spacebar key as the cross appeared on the screen. The software measured simple reaction time in milliseconds and also measured the mean, median, mode, standard deviation and variance. Suryanamaskar group was taught all the asanas of ArunaSuryanamaskar and was performed in synchrony with breath. The asnas performed in ArunaSuryanamaskar include- Samasthiti asana, Pada hastha asana, chaturdanda asana, Kokila asana, Meru asana, Anjali mudra, nasargamukha bhastrika.[1]

Group A

Group A comprised of participants who performed Suryanamaskar. Reaction time was measured on day 1 (baseline scores) and on the day 14th. Participants in this group performed Suryanamaskar in the morning, 3 times a day for 2 weeks.

Group B

Group B comprise of participants who performed 5 minutes of breathing exercises for 2 weeks. Reaction time was measured on day 1 and day 14th.

DATA ANALYSIS AND RESULTS

Table 1- Intra group analysis of Group A who performed Suryanamaskar for 2 weeks

	Mean±SD	Min	Max	P value
Pre	399.14 ± 49.9	312	489	<0.001**
Post 2 weeks	338.19 ± 42.3	279	446	

**Extremely significant P <0.001 by using paired t-test. Values are given as mean±SD.

Table 2- Intra Group analysis of Group B who performed breathing exercises for 2 weeks

	Mean±SD	Min	Max	P value
Pre	373.71 ± 58.5	2985570.1597		
Post 2 weeks	384.80±83.3	215	603	

P value not significant by using paired t-test. Values are given as mean±SD

Table 3- Inter Group analysis of Group A and Group B before and after performing 3 rounds of Suryanamaskar and 5 minutes of breathing exercises for 2 weeks.

	Pre values	Post 2 weeks
Suryanamaskar Group	399.14 ± 49.9	338.19 ± 42.3
Breathing Exs Group	373.71 ± 58.5	384.80 ± 83.3
P value	0.0690	<0.001

**Extremely significant P <0.001 by using unpaired t-test. Values are given as mean±SD.

RESULTS

- All the baseline characteristics of the participants were matched and there were no significant differences between the groups with regards to participants age and BMI.
- Group A showed significant difference between pre and post 2 weeks of Suryanamskar intervention. There was no significant difference seen in Group B pre and post 2 weeks of breathing exercises.
- There was a significant difference seen in Group A who performed suryanamaskar when compared to Group B who performed 5 minutes of breathing exercises over a period of 2 weeks.

DISCUSSION

Our study showed significant improvement in reaction time after performing Suryanamaskar for 2 weeks. Similar studies were found by **Bhavnani et al, (2013)** who showed significant improvement on reaction time and heart rate after performing 3 rounds of Suryanamaskar in 21 female volunteers. They suggested that the improvement in reaction time may be due to an intermediate level of arousal by conscious synchronization of dynamic movements along with breathing.[11]Another study done by **AnandiBalyogi et al, (2017)** reported that reaction time can improve by performing bothasnas and pranayama and combining both together can show faster and more beneficial effectsonreaction time.[12]

The probable decrease in reaction could be due to: 1) Fastest reaction time is seen in an intermediate level of arousal and is poor in case of too relaxed or tensed state. With exercise the reaction time is improved by keeping the muscular tension moderate which shortens the pre contraction reaction time while isometric contraction allows the brain to work faster. 2) Improvement in aerobic capacity as a result of increased VO2 max after performing Suryanamaskar exerts only moderate stress on the cardiorespiratory system by keeping the practitioner within their anaerobic and lactate threshold. 3) Decrease in Reaction time indicates enhanced processing ability of the central nervous system and improved sensory motor performance due to greater arousal, faster rate of information processing, improve concentration and the ability to ignore external stimuli.[4]

Another study by **Sharma VK et al,** have suggested that pranayama enhances the ability to concentrate leading to changes in mental processing (example- focused attention and reduced stress) which are then rapidly expressed within the body via the autonomic and neuro endocrine system.[13]**Anand Sharad Godse et al. (2015)** found out the effects of Suryanamaskar onrelaxation among college going students with high stress. This study concluded that Suryanamskaris effective and helps in improving physical relaxation, at ease/peace, mental quietness, strengthand awareness, joy and reduced sleepiness, somatic stress, negative emotion and worry.[14]

Limitations of our study was that it was conducted only on females and therefore can be carried out or extended by including males. Different age groups should be considered to find out the effects of Suryanamaskar onReaction time.

CONCLUSION

There was a significant shortening of Reaction time in young females after performing Suryanamaskar for 2 weeks. Hence performing Suryanamaskar is beneficial in improving neuromuscular abilities and can enhance central processing ability and therefore such training should be utilized to improve the quality of life of an individual.

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