

# Study of the Utility of Short Course of Yoga to Improve Reaction Time

NOORJEHAN BEGUM, SENDIL KUMARAN D, VENKATESH.G, KULKARNI SB

## ABSTRACT

**Background and Objectives:** The improvement in the reaction time is important, as it is the indicator of the performance in sports and in professional persons. Therefore, there is a need for techniques or courses that can improve the reaction time. Yoga was found to cause a better improvement in the health of the individuals with and without ailments. Hence, this study intended to show its utility as a short course for improving the reaction time.

**Methods:** 25 male healthy volunteers who were aged between 18 and 25 years were selected. The Auditory Reaction Time

(ART), the Visual Reaction Time (VRT) and the Cutaneous Reaction Time (CRT) were assessed before and after the yoga sessions.

**Results:** There was a reduction in the alert responses of ART, VRT and CRT for both the sides. The decrease was statistically significant ( $P < 0.05$ ). The random responses did not show a significant improvement. RT had no correlation with the age, height or the weight.

**Conclusion:** A short course of yoga has a beneficial effect on the reaction time and it can be used as a tool for improving the reaction time.

**Key Words:** Reaction Time, Yoga, Auditory reaction time, Visual reaction time, Cutaneous reaction time

## INTRODUCTION

The Reaction Time (RT) is one of the frequently used tests in the experimental physiology to assess the sensory-motor performance. It is the time interval between the onset of a signal (stimulus) and the initiation of a movement response [1]. The frequently used RT tests are the Auditory Reaction Time (ART), the Visual Reaction Time (VRT) and the Cutaneous Reaction Time (CRT). The RT is an index of the processing ability of the central nervous system. Hence, this is being used in mental chronometry, psychometric psychology and also in training mentally challenged children [2,3]. Also, this test has a physiological as well as a clinical significance, as a shorter RT means a better performance, which is a prerequisite for sports personnel, precision surgeons and similarly for other professionals too [4]. It has also been found that several disorders like diabetes and hypothyroidism prolong the RT and that they can thereby can affect the professional life [5,6]. Therefore, there is a need for therapies that can improve the RT.

Yoga is an ancient science and an art of exercise which is associated with a set of principles and practices which are designed to promote the health and the well-being through the integration of the body, breath, and the mind. Its components include asanas (postures), pranayama (voluntary breath regulation) and dhyana (meditation). Yoga is commonly called as a mind-body therapy and it has often been claimed that it can enhance one's ability to focus the attention, improve the cognitive abilities, decrease the stress and increase and improve the organ system's strength and the suppleness of the nervous system. It has been reported that yoga training improves the human performance, which includes the CNS processing [7]. This fact gave this study an impetus to investigate whether a short course of the yoga practice could be used as a therapy for improving the reaction time. Therefore, this

study intended to find the reaction time tasks for the auditory, visual and the cutaneous stimuli before and after a short course of the yoga therapy.

## MATERIALS AND METHODS

The present follow up study was conducted at the Vijayanagara Institute of Medical Sciences (VIMS), Bellary, India. After obtaining the institutional ethical clearance, 25 male healthy volunteers who were right handed, who were aged between 18-25 years, were selected. They had a clinically normal hearing and vision. The selected subjects had not practiced any long term exercises, sports or yogic postures previously. Smokers, alcoholics and the subjects with any chronic illnesses like hypertension or diabetes were excluded. The selected subjects were briefed about the study protocol and a written informed consent was obtained from them.

### Procedure:

Before the start of the actual study, a session was organized to familiarize the participants with the instrument and to train them on the test procedures. The subject's anthropometric parameters were recorded. Their ART, VRT and the CRT were measured in a quiet secluded room, whose ambient temperature was about 27°C, between 10 AM and 12.30 PM, by using a RESPONSE –ANALYSER (Model YSRT-0101 from Yantrashilpa electronics, Pune) instrument. The instrument has 2 buttons, the first one, a start button, which was handled by the examiner to deliver the stimulus and the second button was the stop button (response switch), which had to be pressed by the participant when he perceived the stimulus. The thumbs of the right and the left hand of each subject were used alternatively to press the response switch to get the reading for that particular hand. For the ART, a stimulus was delivered through a head phone of a capacity of 1000 Hz tone. For the VRT, a visual stimulus was delivered through a glowing

bulb. The start and the stop buttons were connected to a computer which recorded the reaction time in milliseconds. The CRT test measures the response to a cutaneous (touch) stimulus. Here, the stimulus was a contact between the plunger and the skin. The subjects were asked to press the response switch as soon as the touch with the plunger was felt by the other hand. The reading on the display indicated the response time to the cutaneous stimulus in milliseconds. The 'alert' values were obtained by keeping the participants mentally alert by a word of caution to avoid possible distractions. 'Random' values were obtained by changing the time of occurrence of the stimuli without cautioning the participants. The yoga therapy was instituted by a qualified yoga instructor for 6 days a week, between 5-7am, for one month. The yoga components included suryanamaskars, asanas and pranayama. The values which were obtained before and after the yoga course were tabulated, compared and analyzed by using the two tailed paired Student's t-test. Pearson's correlation was used to find any correlation of the reaction time with the age, anthropometric measurements and the blood pressure.

## RESULTS

The results which were obtained have been tabulated in the [Tables/Fig- 1, 2 and 3]. [Table/Fig- 1] shows the range, mean and the standard deviation for the age, the anthropometric measurements and the blood pressures of the study group. [Table/Fig- 2] shows the alert responses before and after the yoga course. It shows that there was significant decrease (<0.05) in the alert values of all the reaction times after the short course of yoga. [Table/Fig-3] shows

Parameters	Range	Mean ± SD
Age (years)	18 - 24	20.24 ± 1.69
Height(cms)	158-192	171.96 ± 10.15
Weight(kg)	47-67	54.76 ± 6.24
Surface Area	1.5-1.78	1.6396 ± 0.07
Pulse rate/min	68-92	79.2 ± 5
Systolic blood pressure(mm of Hg)	106-128	112.4 ± 5.25
Diastolic blood pressure(mm of Hg)	68-92	76.8 ± 6.19

**[Table/Fig-1]:** Show the anthropometric measurements of the participants

Reaction Time (milliseconds)		Before yoga	After yoga	p-value
Auditory	Right	180 ± 16.8	169 ± 16.4	0.02*
	Left	181 ± 16.7	170 ± 16.5	0.02*
Visual	Right	185 ± 16.4	174 ± 16.8	0.02*
	Left	186 ± 16.2	174 ± 16.5	0.01*
Cutaneous	Right	190 ± 16.0	179 ± 16.8	0.02*
	Left	192 ± 15.9	180 ± 16.5	0.02*

**[Table/Fig-2]:** Show the Alert responses before and after yoga

Reaction Time (milliseconds)		Before yoga	After yoga	p-value
Auditory	Right	207±26.9	192±28.9	0.08
	Left	220±32.7	201±29.3	0.03*
Visual	Right	229±31.2	212±29.9	0.06
	Left	242±35.7	224±29.6	0.05
Cutaneous	Right	255±38.4	234±31.7	0.04*
	Left	265±39.8	245±34.3	0.06

**[Table/Fig-3]:** Show the Random responses before and after yoga

the random responses before and after the yoga course. The ART on the left hand and the CRT on the right hand, showed significant differences (<0.05) before and after the yoga, but the other reaction times did not show any differences. By using the Pearson's correlation between the age, anthropometric measurements, blood pressures and the basal reaction times (the reaction times before the yoga course); it was found that there were no significant correlations between them.

## DISCUSSION

The reaction time, the interval between the presentation of a stimulus to a subject and the subject's response, is often used as an indicator of the enhanced motor skills and the better overall fitness in sports-specific training and competitive situations [8]. Therefore, there is need of techniques to improve the reaction times.

A short course of yoga training improves the reaction time. The random responses showed an appreciable but a statistically insignificant shortening of the reaction time. The probable reason may be that, for the improvement in the random responses, a longer duration of the practice is warranted. Also, RT did not show a correlation with the height or weight because RT is an independent variable and because it does not depend on the anthropometric parameters.

Yoga is involved in restoring the under activities of the Parasympathetic Nervous System (PNS) and the Gamma Amino-Butyric Acid (GABA) systems. This restoration may be partly through the stimulation of the vagal nerves [9]. A Single-Photon Emission Computed Tomography (SPECT) study demonstrated that the yoga training program increased the Cerebral Blood Flow (CBF) and that the changes in particular, appeared to have a greater impact on the right hemispheric function, particularly in the frontal lobes [10]. Now, it can be emphasized that the improvement in the reaction time may be related to the above facts. Thus, this study concluded that a short course of yoga course can be used as a tool for improving the reaction time, which is useful in sportsmen and in professionals like surgeons.

This study was limited by its sample size and also, this study needs to be extended to the patients with disorders like Diabetes mellitus and hypothyroidism.

## REFERENCES

- [1] Senel O, Eroglu H. The correlation between the reaction time and the speed in elite soccer players. *Journal of Exercise Science and Fitness* 2006;4:126-30.
- [2] Linden DE. What, when, where in the brain? Exploring mental chronometry with brain imaging and electrophysiology. *Rev Neurosci.* 2007;18(2):159-71.
- [3] Parrot AC. The performance tests in human psychopharmacology (2): content validity, criterion validity, and face validity. *Hum Psychopharmacol.* 1991; 6:91-98.
- [4] Tandon OP. The average evoked potentials—the clinical applications of the short latency responses. *Indian J Physiol Pharmacol.* 1998 ;42(2):172-88.
- [5] Richerson SJ, Robinson CJ, Shum J. A comparative study on the reaction times between type II diabetics and non-diabetics. *Biomed Eng Online.* 2005 Feb 21;4(1):12.
- [6] Avramides A, Papamargaritis K, Mavromatis I, Saddic G, Vyzantiadis A, Milonas I. The visual evoked potentials in hypothyroid and hyperthyroid patients before and after the achievement of euthyroidism. *J Endocrinol Invest.* 1992 Nov;15(10):749-53.
- [7] Hayes M, Chase S. Prescribing yoga. *Prim Care.* 2010 Mar; 37(1):31-47.
- [8] Spierer DK, Petersen RA, Duffy K. The response time to the stimuli in division I soccer players. *J Strength Cond Res.* 2011; 25(4):1134-41.

- [9] Streeter CC, Gerbarg PL, Saper RB, Ciraulo DA, Brown RP. The effects of yoga on the autonomic nervous system, gamma-aminobutyric-acid, the allostasis in epilepsy, depression, and on post-traumatic stress disorders. *Med Hypotheses*. 2012 Feb 24. [Epub ahead of print].
- [10] Cohen DL, Wintering N, Tolles V, Townsend RR, Farrar JT, Galantino ML, et al. The cerebral blood flow effects of yoga training: a preliminary evaluation of 4 cases. *J Altern Complement Med*. 2009 Jan;15(1):9-14.

**AUTHOR(S):**

1. Dr. Noorjehan begum
2. Dr. Sendil kumaran D
3. Dr. Venkatesh.G
4. Dr. Kulkarni SB

**PARTICULARS OF CONTRIBUTORS:**

1. Professor, Department of Physiology, VIMS, Bellary, India.
2. Associate Professor, Department of Physiology, Sri Siddhartha Medical College, Tumkur, India.
3. Associate Professor, Department of Physiology, Sri Siddhartha Medical College, Tumkur, India.
4. Professor, Department of Physiology, KIMS, Hubli, India.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Sendil Kumaran D,  
Associate professor, Department of Physiology  
Sri Siddhartha Medical College, Tumkur-570107,  
Karnataka, India.

Phone: 9448006713

E-mail: kumarsendil@yahoo.com

**FINANCIAL OR OTHER COMPETING INTERESTS:**

None.

Date of Submission: **May 18, 2012**

Date of Peer Review: **Jul 28, 2012**

Date of Acceptance: **Aug 11, 2012**

Date of Publishing: **Sep 30, 2012**