



## EFFICACY OF CLASSICAL HATA YOGA TRAINING ON PERFORMANCE IN A VIGILANCE TEST AMONG HEALTHY ADULTS.

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### ABSTRACT

**Background:** Vigilance is a term used alternatively with alertness or sustained attention and reflects arousal and cognitive performance. Today's society, thrive on performance, competition and perfection, which leads to an insidious increase in stress. Stress causes psycho-physiological damage that is often underestimated. Stress has an impact on sustained attention task performance resulted in mental health disorders. Mind-body techniques such as yoga have shown to improve stress reliance and thus enhances cognitive functions; attention, visual scanning, memory retrieval. The objective of this study was to determine whether classical hata yoga training would enhance the performance in vigilance task specific for sustained attention and alertness.

**Material and Methods:** Forty one participants who had enrolled in a forty five days Classical Hata Yoga training program. Their ages ranged between 18 and 50 years (group average  $\pm$ S.D., 29.4 $\pm$ 10.3 years, both genders). Those who have any chronic illness and mental illness, and those who are not willing to participate were excluded. Classical Hata Yoga training is given for 45 days, 3hours/day. At baseline and following forty five days, all participants completed DVT.

**Results:** Classical hata yoga training program showed significant change in DVT scores, showed 22% reduction ( $P < 0.0001$ ) in total time taken and 41% decrease ( $P < 0.0001$ ) in error scores.

**Conclusions:** The forty five days classical hata yoga training program was successful in enhancing the performance in vigilance task among adults.

**KEYWORDS :** vigilance, Classical Hata Yoga, DVT

### INTRODUCTION

Vigilance is a term used alternatively with alertness or sustained attention and reflects arousal and cognitive performance[1]. Today's society, thrive on performance, competition and perfection, which leads to an insidious increase in stress. Stress causes damage that is often underestimated. Stress has an impact on sustained attention task performance [2]. The most studied physiologic responses to stress are activation of the hypothalamic–pituitary–adrenal (HPA) axis and the LC–NE-sympathetic nervous system pathway. The amygdala and parasympathetic system also interact with this latter pathway [3]. The function of the amygdala impacts vigilance and is thought to be affected by post-traumatic stress disorder which is associated with hyper-vigilance, difficulty concentrating, and sensitization of the alarm response [4]. Some of the interaction between stress and alertness is presumably mediated via the amygdala and its corticotrophin-releasing factor inputs to the LC[5]. and result in an increased distractibility and a deficient focused attention. Findings suggest that yoga corrects imbalances in one's stress response by decreasing sympathetic nervous system activity and increasing parasympathetic nervous system activity [6]. Yoga research has demonstrated stress reduction among several populations, including people experiencing high levels of stress[7]. Several studies have reported the beneficial effect of multiple practices of Yoga including physical postures and meditation on attention. Yoga practices consisting of physical postures (Asana), voluntary regulation of breathing (Pranayama), relaxation practice and visual focusing exercises (Trataka) improve attention span in school children[8,9,10]. However, the changes in Sustain attention that characterize the efficacy of yoga for adults have not been reported adequately. Hence, the present study was designed to assess whether forty five days classical hata yoga training would enhance the performance in vigilance task specific for sustained attention and alertness.

### MATERIAL AND METHODS

Forty one participants who had enrolled in a forty five days classical hata yoga training program. Their ages ranged between 18 and 50 years (group average  $\pm$ S.D., 29.4 $\pm$ 10.3 years; 29 females and 12 males). We have fully explained the potential risks and benefits in the study before written informed consent was provided by participants; the study was approved by the ethics committee of the institution, Lakulish Yoga University, located in Ahmadabad, Gujarat, India. The selection criteria included: Subjects who were healthy, age between-18-50 yrs, Education: 12<sup>th</sup> standard and above and those knowing English, willing

to participate were included. Those having neurological and psychiatric disorders (based on case history), those who have practiced Yoga for the last 3 months and those who have major eyesight problems (in vision) were excluded from the study. In this study we adopted a convenient sampling method to recruit the subjects who were undergoing forty five days Classical Hata yoga training program at Lakulish Yoga University, Ahmadabad, Both genders, Age group 18 to 50 years, a single group pre-post design was used. The 45 days study was successfully completed by 41 participants.

### Design and setting

The trial was a single group, pre-post trial. Participants were assessed on day 1 and day 45 of the forty five days classical hata yoga training program, when the assessment was completed, respondents were appreciated for their time and cooperation. The training program was held in a non residential Lakulish yoga university, located in Ahmadabad, Gujarat, India.

### Intervention

The forty five days classical hata yoga training program: a yoga teacher training program consisted of two sessions each day. The first session was between 08:30 hours and 11:30 hours for practice and the second session was between 12:00 hours and 13:30 hours for theory. In a day participants practiced shithilikarana vyayamas (loosening practices) followed by yogasanas and relaxation techniques with pranayama practices. The concepts used to develop a specific module of teaching for training program were taken from the classical hata yoga scripture of Lakulish yoga tradition [11], one of the oldest schools of hata yoga in India. Yoga is defined as mastery over the modifications of mind (*Chitta Vritti Nirodhah*-definition of *yoga* by *Patanjali*). It helps to remove the unnecessary surges of neuromuscular activation resulting from heightened stress responses that may contribute to aging.

### Assessments

#### Vigilance or sustained attention

Sustained attention was measured using a digit vigilance test (DVT) of proven validity and reliability [12], which consisted of the numbers 1 to 9 arranged randomly in rows. Each sheet had 50 rows with 30 digits per row. The participants were instructed to cancel only 2 digits (6 and 9) as quickly as they could. They were asked not to: (i) cancel other digits or (ii) miss any of the target digits (6 and 9). The total time taken to complete the test and the number of errors made were noted.

**Data collection & extraction**

The DVT data was collected before and after the 45 days classical hata yoga training. The digit vigilance task was scored using the standard method [12]. The total time taken to complete the test (in minutes) and number of errors made were noted for analysis.

**Data analysis**

The subjects were asked to cancel out digits 6 and 9. The time to complete the test along with the number of correct responses and errors was noted [13]. Statistical analysis was performed with the help of Statistical Package for Social Sciences version 19. The Kolmogorov, Smirnov test showed that the data was not normally distributed. Hence, Wilcoxon signed ranks test was used to compare means of the data collected before and after the 45 days classical hata yoga training.

**Results**

The data analysis showed 22% decrease ( $P < 0.0001$ ) in total time taken and 41% decrease ( $P < 0.0001$ ) in error scores for DVT [Table 1].

**Table -1 : DVT Changes after Classical hata yoga training program**

Variables	Pre Mean± SD	Post Mean± SD	% Change	P-value
DVT task: Time Taken (in minutes)	8.89 ± 1.66	6.97 ± 1.42	22%	0.0001***
DVT task: No. of errors	7.19 ± 1.38	4.24 ± 0.43	41%	0.0001***

\*significant at  $P < 0.05$ , \*\* significant at  $P < 0.01$ , \*\*\*significant at  $P < 0.00$  (Wilcoxon Signed Ranks Test) DVT: digit vigilance test.

**DISCUSSION**

The present study intended to study the effect of forty five days of Classical hata yoga training on the performance in a vigilance task among adults. Improvement in the performance of vigilance task not only require sustain attention, but also visual scanning and cognitive flexibility. Decrease in total time taken and error scores in DVT following classical hata yoga training suggest improvement in vigilance task performance. Thus, the present study suggests a significant increase in sustain attention scores in adults following classical hata yoga training. The vigilance task requires selective and sustain attention as well as the ability to shift attention [14]. The mechanism underlying the improvement in performance of vigilance task in this study might be due to enhancement in internal awareness [15], selective attention [16], and cortical inhibition [17], because of classical hata yoga training including yoga postures, relaxation, Suryanamakara. Also the Yoga breathing techniques (Pranayama) had influence on pre-frontal cortex [18], which is associated with memory, attention, and executive functions [19]. It may regulate the autonomic functions by dominating sympathetic [20], or parasympathetic tone [21], which could be the reason for reduction of anxiety and chronic stress levels and cause for improvement of attention. Yoga-based guided relaxation and meditation has also been reported to reduce sympathetic activity, balance neuro-endocrine path and decrease anxiety and stress levels [22], could have facilitated increase attention task performance. The current study on the effect of the Classical Hata Yoga intervention provides evidence in improving performance on vigilance task in adults which may help them to prevent cognitive decline. Intervention of Classical Hata Yoga training for the period of forty five days showed significant improvements on vigilance performance in the adult participants.

**CONCLUSION**

The present study suggests that classical hata yoga training enhances performance in vigilance task by improving the sustain attention among adults, thus paving the way for preventing cognitive decline. Further well-designed studies are advocated before a strong recommendation can be made.

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**Conflict of interest**

None

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