

Effects of pranayama and Surya namaskar yogic practice on cognitive performance in medical students

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Background: Recent studies have suggested that yoga reduce stress levels and anxiety accordingly reducing stress increases cognitive performance. The present study attempted to determine the combined yoga practice is associated with higher cognitive performance in medical students. **Materials & Methods:** All the instructions were given to the participants, they were asked to Unscramble 20 scrambled words in 5 minutes of time. The score was noted and was asked to perform yoga for four weeks. The same score was collected after a yoga session and was compared with the previous values. **Result:** Analysis showed that the yoga group ($M=15.2$, $SD=4.25$) and the pre-yoga group ($M=09.49$, $SD=3.11$) did not differ significantly on cognitive performance, $p=<0.005$. **Conclusion:** Combined effect of Pranayama and suryanamaskar are beneficial effect on improving cognitive function but it was statically insignificant.

KEYWORDS: Pranayama, suryanamaskar, yoga, cognitive functions.

INTRODUCTION

Yoga is an ancient holistic system which originated in India more than 3,000 years ago. Although there are several definitions for yoga, most schools of yoga incorporate elements of Asanas (physical movements) including relaxation, Pranayama (breathing practices), and dhyana (meditation). Pranayama involves manipulation of the breath and it consists of three phases: "puraka" (inhalation); "kumbhaka" (retention) and "rechaka" (exhalation)^[1]. Pranayama can be practiced as either fast or slow pranayamas. Both Suryanamaskar and slow pranayamas are beneficial, Executive functions refer to cognitive processes that regulate, control, and manage other cognitive processes^[2]. Stress is a common characteristic for a typical medical student. Academic stress can result from many different stressors, such as final exams, term papers, practical examinations, and excessive homework^[3]. Students would benefit from the identification of techniques that reduce stress and thereby potentially enhance cognitive performance^[3]. Yoga is a technique that might be effective in reducing stress experienced by medical students in certain performance situations. Research supports the claims that yoga can significantly improve physical and mental wellness^[4]. Additional studies have also yielded similar results in regards to stress reduction. Most of the researchers studied the long term and short effects of cognitive behavioral therapy and yoga^[5,6], limited research on combination of different types of yoga. So the present study was undertaken to find the short term effect of combination of pranayama and suryanamaskar yogic practice on cognitive function

In this study, we hypothesized that the individuals receiving yoga intervention would perform higher on the cognitive measure when compared to the pre yoga session.

MATERIALS AND METHODS

Study design: An interventional study

Ethics approval: The study was approved by the institutional ethics committee and informed consent was taken from the participants

Study location: MNR medical College, Sangareddy

Study period: 3 months **Sample size:** 40 participants, 20 female, 20 male were involved in the study.

Study population: Medical students from the MNR Medical College who were enrolled in an introductory research methods class.

The age of the participants ranged from 18 to 24 years.

Inclusion criteria: participants were not undergone yoga previously, recent past history of surgery, nonalcoholic and nonsmokers.

Exclusion criteria: Physically challenged persons.

Methodology:

Following the informed consent procedure, participants were instructed that they would be participating in a yoga session. The cognitive performance was assessed on the participants before yoga practice, they were asked to Unscramble 20 scrambled words in 5 minutes of time. The score was noted and were asked to perform yoga for four weeks. The same score was collected after yoga session and was compared with the previous values. And that was compared with post yoga practice. Yoga included was five selected pranayamas i.e Pranava, Bhastika, Bramhari, Anulom vilom and Kapalabathi and twelve sets of suryanamaskar^[5,8]. We used a word scramble that we created to test for cognitive performance (see Appendix A). The word scramble included 20 words with the letters scrambled from their original state. A hint relating to the scrambled word was also given. An example from the puzzle is "LARNPODT" paired with the hint, "city". The correct answer for the pairing would be Portland. Cognitive performance was measured in regards to how many of the words were unscrambled correctly within a five-minute time limit.

RESULTS

To score the cognitive test, we calculated the number of correct responses from each participant. The puzzles were scored between the values of 0 and 20, with one point given for each correct answer. We then conducted a two-tailed independent-groups *t* test to test whether cognitive performance differed between the two groups. Analysis showed that the yoga group ($M=15.2$, $SD=4.25$) and the pre yoga group ($M=9.49$, $SD=3.11$) did not differ significantly on cognitive performance, $p < 0.005$.

Cognitive function	Score
Pre yoga session	9.49±3.11
Post yoga session	15.2±4.25

Table 1. Cognitive score Pre and post yoga

DISCUSSION

The results of this experiment support our hypothesis that participants receiving the yoga intervention would perform higher on the cognitive measure due to reduced stress levels from practicing yoga. Our results indicate that yoga increase students' cognitive performance on a simple task. Since the experiment by Evans *et al.* (1996) suggests that that yoga could be an effective coping mechanism amongst medical students to decrease stress and consequently may improve academic performance^[6]. These findings are in consistent with past research, such as the Granath *et al.* (2006), which supports the claim that yoga decreases perceived stress. Therefore, we predicted that yoga would result in higher cognitive performance^[5]. In a studies by West *et al.* (2004), and Granath *et al.* (2006), the yoga interventions were held in relaxing rooms with a qualified yoga instructor. Participants were also able to use yoga mats during the yoga session^[5,8]. The bottom-up mechanisms of pranayama practice may be induced through the stretch of respiratory muscles, specifically the diaphragm^[8].

During both pranayama and suryanamaskar practice, when participants intentionally focus on breathing at different frequencies of respiration and intend to relax, attention is drawn away from extraneous distracting stimuli. With continuous pranayama practice, the participants' ability to concentrate is enhanced and the changes in mental processing (e.g., focused attention and reduced stress) are rapidly expressed in the body via the autonomic and neuro endocrine systems. This reorganizes neural representation within the CNS and improves bidirectional communication between the cerebral cortex and the limbic, autonomic, neuro endocrine, emotional, and behavioral activation. Also, generalized alteration in information processing at thalamo-cortical level induces modification in neural mechanisms which regulate the respiratory system^[9].

Additionally, our word-unscramble puzzle may be an effective measure of cognitive ability. In the experiment by Granath *et al.* (2006), the cognitive measure was a simple arithmetic test which assesses the cognitive performance of an individual^[5]. Our experiment resulted in abroad range of scores (4-20), indicating that students' ability to unscramble words varied widely. In other words, our cognitive measure may have better results after practicing combined yogic exercises.

CONCLUSION

Combined effect of Pranayama and suryanamaskar are beneficial effect on improving cognitive function but it was statically insignificant

Limitations of the study: Further studies are required with the larger population, wide scope long and longer duration.

Conflict of Interest: No

Source of Funding: Nil

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APPENDIX A

Instructions: Unscramble these words.

Scrambled Word	Hint	Answer
ZRAEB	Animal	
MEALP	Tree	
EFEFOC	Drink	
LETB	Accessory	
EHAPC	Fruit	
ATWREES	Clothing	
UWSBYA	Transportation	
NASIP	Country	
EEDSRRS	Furniture	
PTALPO	Electronic device	
LARNPODT	City	
TPLIU	Flower	
TVOES	Appliance	
NITSNE	Sport	
CICOLBOR	Vegetable	
RYAGN	Mood	
MEANI	State	
NGSILHE	Major	
CNAOBR	Element	
NOIVLI	Instrument	

Table 2.