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Study of immediate effect of Anulom Vilom pranayama on cognition in Osmania Medical College Students.

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ABSTRACT

Background and objectives: Voluntary control of respiration or even merely focusing on breath yield additional access and synchrony between different areas of brain. Pranayama/yogic breathing has a positive impact on overall health. Manipulation of breath brings our attention away from all the external stimuli and thereby helps in improvement of executive functions of the cerebral cortex. The objective is to assess the immediate effect of alternate nostril breathing on Cognition.

Methods: An interventional pretest posttest study was conducted among 60 students of age 20-30 years, who performed Anulom Vilom Pranayama after a demonstration session for five minutes. Six letter cancellation test to assess cognition is performed by them before and after Pranayama. Results are obtained by comparison between pre and posttest values and statistically analyzed by paired t-test.

Results: There is a significant increase in total and net scores and decrease in number of errors ($p<0.01$) in the post test indicating a positive association between Pranayama and Cognitive functioning.

Discussion and conclusion: Controlled breathing modulate brain activity by dual mechanisms: Brainstem mediated activation of cortical areas and nasal respiratory rhythm stimulating hippocampus. Regular practice of Anulom Vilom Pranayama definitely enhances cognitive capabilities when immediate effect itself indicates heightened Cognition.

Keywords: Cognition, Anulom Vilom Pranayama, Hippocampus.

I. INTRODUCTION

Pranayama is a traditional part of yoga, Prana means breath and Ayama means stretching or expansion. Pranayama consists of three phases: ‘‘puraka’’ is inhalation, ‘‘kumbhaka’’ is retention and ‘‘rechaka’’ is exhalation that can be either fast or slow. It includes different breathing patterns and each pattern has specific effect on stimulating afferent pathways[1,2].

Voluntary control or just merely focusing on ones breath yields additional access and synchrony between different areas of brain. Network of areas involved in volitional breathing are caudal-medial frontal cortex, premotor area, orbitofrontal and motor cortex, insula, superior temporal gyrus, amygdala and attention to breathing involves anterior cingular cortex, premotor area, insula, hippocampus providing insight into potential brain mechanisms involved in therapeutic breathing exercises.[3]

Many studies had been conducted basedon pranayama and its effects on various parameters but there are very less evidences on immediate effect of this conscious alteration of breathing pattern, present study is intended to bring awareness among students about benefits of pranayama in increasing their cognitive capabilities.

AIM AND OBJECTIVES

To study immediate effect of Alternate nostril breathing on cognition in students of Osmania medical college.

II. MATERIALS & METHODS

This study was conducted in Osmania medical college. The study commenced after obtaining approval from the ethical committee.Students in the age group of 20-30years, who were in self-reported good health and those who gave their consents to participate in the study(n=60) are included. Subjects were recruited for this study after applying both inclusion and exclusion criteria.

INCLUSION CRITERIA

Students of either sex, above 18 years and below 35 years of age.

EXCLUSION CRITERIA

Students with previous practice of yoga.
Students with history of septal defects.
Students with history of any acute or chronic illness.
Students on any medication.

The procedure of pranayama and cognitive tests was demonstrated to all the students.Subjects were asked to perform cognitive test within a specified time.

Six letter cancellation test: This test has six target letters on top of the page with randomly arranged

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alphabets below them. Students were asked to cancel those six target letters either one at a time or six at a time, following vertical or horizontal pattern or randomly according to their wish within a period of 90 seconds. This test is used to measure concentrating ability, response speed and visual scanning[4,5].

Anulom Vilom pranayama: Subjects were made to sit comfortably in a chair with back straight and were asked to close their eyes and focus on their breath and make Vishnu mudhra (closing index and middle finger) and close their right nostril with thumb and left nostril with their ring finger alternatively during inhalation and exhalation each phase lasting for 6 seconds according to instructions for 5minutes[2]. Immediately after performing pranayama Six Letter Cancellation test is performed by the students.

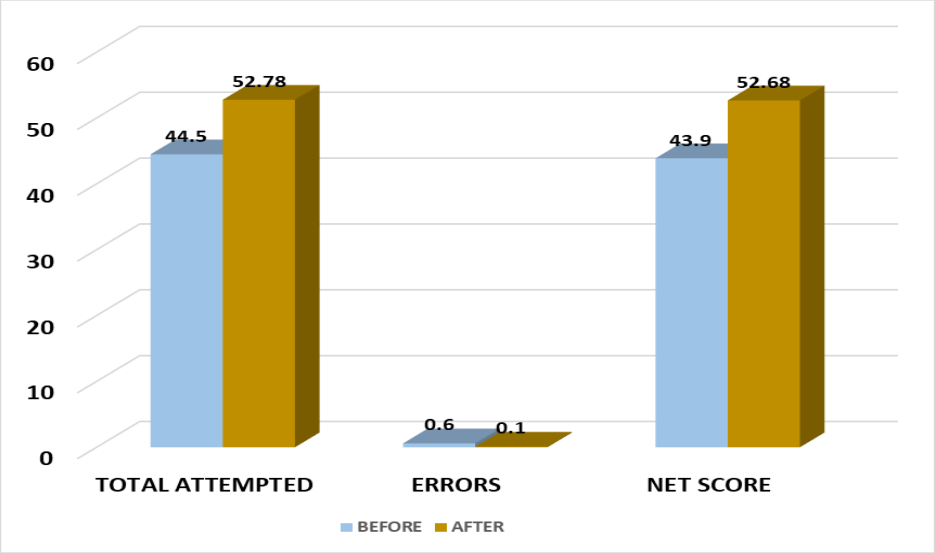
III. RESULTS

Data analysis was done usingpaired t test to find the significant difference in the mean value change in performance of SLCT. Data has been presented as mean, standard deviation. P value <0.05 was considered as statistically significant (*).

TABLE 1: STATISTICAL ANALYSIS OF PERFORMANCE OF SIX LETTER CANCELLATION TEST, BEFORE AND IMMEDIATELY AFTER 5MINUTES OF ANULOM VILOM PRANAYAMA.

PARAMETERS	Mean ± SD		PAIREDT TEST	p-Value
	Before	After		
Total Attempted	44.50±10.41	52.68±10.85	8.383	0.0001***
Errors	0.60±1.70	0.10±0.44	2.505	0.150**
Net Score	43.90±10.33	52.68±10.82	8.967	0.0001***

FIGURE 11: COMPARISON OF PERFORMANCE OF SIX LETTER CANCELLATION TEST, BEFORE AND IMMEDIATELY AFTER 5MINUTES OF ANULOM VILOM PRANAYAMA.



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IV. DISCUSSION

In the present study, there was an increase in mean values of total attempted before and after 5minutes is 44.50±10.41 and 52.68±10.85with p value 0.0001 which is highly significant, there is also increase in net scores before and after 5minutes43.90±10.33 and52.68±10.82 with p value of 0.0001 which is also highly significant and mean of errors before and after 5minutes are 0.60±1.70 and 0.10±0.44 with p value less than 0.015 showing significant decrease in errors indicating improvement in cognitive capabilities after practice of pranayama in Anulom Vilom pranayama[4].There has been a significant improvement of cognitive test results5minutesafterpranayama when compared to pre test.

All the body mind therapies work bidirectionally by Top down and Bottom up mechanisms.

Topdown mechanism:

It includes intentional and conscious mental activities. These are initiated through mental processing at the level of cerebral cortex.[6,7]

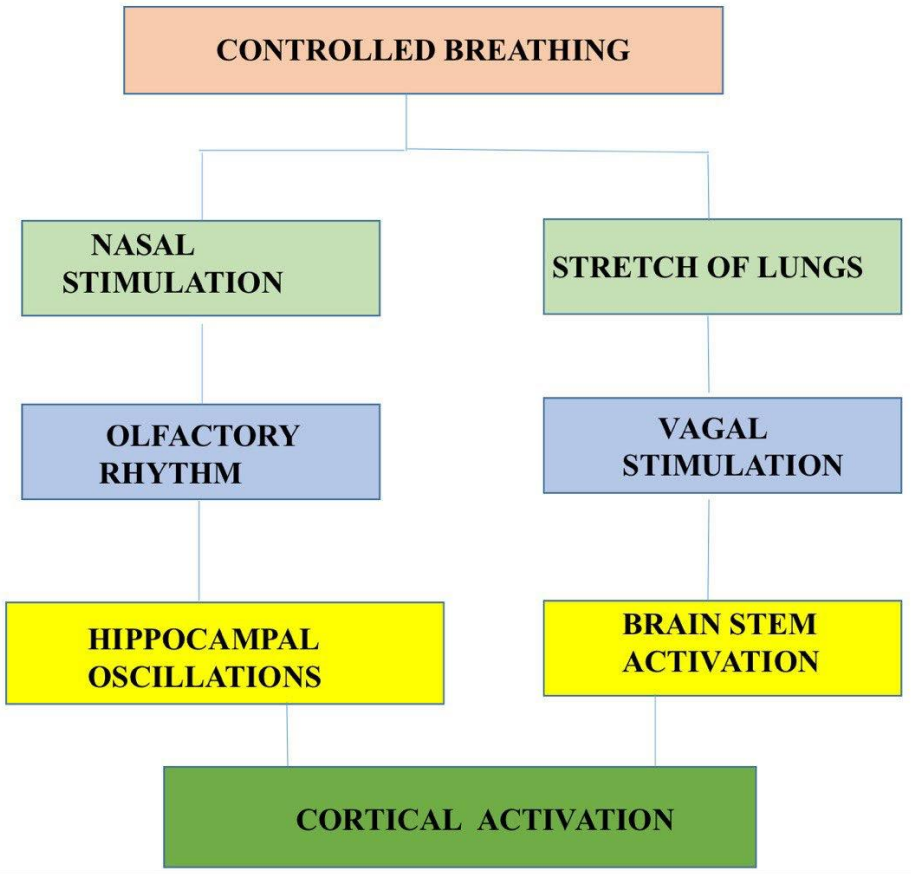
Bottomup mechanism:

In this mechanism afferents from chemoreceptors, mechanoreceptors and visceroceptors are forwarded through ascending pathways to brain stem and finally to cortex[6,7].

Controlled breathing modulate brain activity by dual mechanisms by Brainstem mediated activation of cortical areas and nasal respiratory rhythm stimulating hippocampus[6].

Pranayama helps in stretching of lungs causing vagal stimulation which activates para sympathetic system and thereby helps in reducing stress[4], also causes activation of cortical centers. Stretch receptors in the pulmonary tissue activates the parasympathetic system and through afferents activates various cortical centres. The pathway involves stimulation of stretch receptors followed by activation of vagal afferents reaching Nucleus tractus solitarius from there neurons reaches various cortical centres.[1]

The phase of natural breathing through nostrils is actively used to promote oscillatory synchrony and to optimize information processing in brain areas mediating goal-directed behaviours[8] by activating areas associated with olfactory cortex which include Amygdala,Pyriformcortex, Orbitofrontal cortex and Hippocampus[9].



In Anulom Vilom pranayama, there has been a continuous stimulation of nasal olfactory mechanoreceptors due to continuous flow, also prolonged phases of respiration causing stretch of lungs stimulating stretch receptors.

V. CONCLUSION

Cognitive performance is higher after intervention indicating a positive association between Pranayama and cognitive functioning.

Regular practice of Pranayama definitely enhances cognitive capabilities when immediate effect of Pranayama itself indicates heightened cognition.

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