

Original Article

Combined effect of Sectional breathing and OM chanting on Motivation and Memory among healthy individuals – A Randomized Controlled Trial

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ABSTRACT

Background and Objectives: Memory is pivotal in daily life, influencing emotional well-being, decision-making, and social interactions. Motivation is crucial in the life of undergraduate college students for improvement in their studies. Yogic practices can help one become calm, a prerequisite for having a good memory and high achievement motivation. Sectional breathing helps the practitioner to achieve more energy and vitality, brings tranquillity to day-to-day activities and reduces stress. 'OM' chanting clears the mind of all external distractions, restores focus, and gives the body new energy. Hence, this study aims to assess the combined effect of sectional breathing and OM chanting on motivation and memory in healthy individuals. **Materials and Methods:** 80 subjects between the age group of 20-28 years were recruited in this randomized controlled trial. Study participants were randomly divided into a study group (Sectional breathing and OM chanting) and a control group (no intervention). PGI Memory Scale (PGIMS) and Deo 0.05–Mohan Achievement Motivation Scale (DMAMS) were assessed before and after the intervention. The results obtained were tabulated and then statistically analysed. **Result:** Pre- and post-intervention analysis in the experimental group revealed statistically significant differences in DMAMS and PGIMS scores ($p \leq 0.05$, respectively). Conversely in the control group, there were no statistically significant differences in both DMAMS and PGIMS scores ($p \geq 0.05$). **Conclusion:** The present study concluded that practice of Sectional breathing and OM chanting for 8 weeks in healthy subjects will bring a positive influence in improving the motivation and memory of the subjects.

Key words: Motivation, Memory, Sectional breathing, Om chanting, Yoga

Yoga is primarily a spiritual practice that focuses on achieving harmony between body and mind. The word "Yoga" is derived from the Sanskrit root "Yuj," which means "to join," or "to unify" [1]. Patanjali defines asanas as a body posture held with stability and ease [2]. Pranayama is the control of breath movement [3]. Yogic breathing techniques which is the manipulation of breath movement have a positive effect on mental, psychological and cognitive function [4]. The World Health Organization (WHO) states that "mental health comprises subjective well-being, perceived self-efficacy, autonomy, competence, intergenerational reliance, and self-actualization of one's intellectual and emotional capacity, among others." Mental health encompasses our emotional, psychological, and social well-being in addition to the absence of mental illness [5].

Cognitive processes are the mental operations involved in knowing; they are crucial in memory, perception, and other

mental operations like reasoning and problem-solving. Memory refers to the ability or capacity to store and recall information [6]. Many of us consider our memory to be somewhat similar to a video camera or other recording device. It accurately records events that can be retrieved later by simply pressing the 'play' button. However, this video-camera concept of memory is not entirely correct because memories are not just static recordings that can be accessed; they are dynamic and constantly changing. They can be distorted and manipulated in various ways. Each time we recall something, we make a slight modification to that memory [7]. Almost every part of our everyday lives depends on memory, including identifying friends and companions, recalling shopping lists, and remembering to take our daily medicine prescriptions. It is crucial to comprehend how and when stress improves or degrades memory since many people are frequently exposed to stressful events. Each of us is affected by memory in important ways [8].

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Psychologists define motivation as a process that begins with a physiological or psychological deficiency or need and then activates a behaviour or drive aimed at a goal or incentives [9]. Psychology defines memory as the ability to encode, store, and retrieve information [10].

In recent studies, yogic practices can help one become calm, which is a prerequisite for having a good memory and high achievement motivation. Numerous researches on adult populations have established the significance of yoga, which is more effective than exercise at enhancing psychological outcomes. Studies that compared yoga to physical education showed that yoga has better effects on students [11].

Sectional Breathing is the preparatory breathing practice for pranayama that assists in correcting wrong breathing patterns such as habitual over-breathing, breath holding, or shallow breathing. It consists of three sections of breathing – abdominal, thoracic and clavicular breathing and full yogic breathing that incorporates all the three sections of the breathing. It helps the practitioner to achieve more energy and vitality, brings tranquillity in day-to-day activities and reduces stress [12].

OM chanting is the chanting of the sacred divine word ‘OM’ (AUM) consisting of three syllables or letters – ‘A’, ‘U’ and ‘M’. A condition of purity in the body, mind, and spirit can be achieved by chanting OM (AUM). Chanting of ‘OM’ clears the mind of all external distractions, restores focus and gives the body new energy [13].

The literature review reveals few studies on sectional breathing and OM chanting for health and disorders have shown good results. However, none of the studies were conducted to evaluate the combined effect of sectional breathing and OM chanting on motivation and memory. Hence, this present study aims to evaluate the combined effect of sectional breathing and OM chanting on motivation and memory among healthy individuals for its clinical application.

MATERIALS AND METHODS

The present study adopted a randomized controlled trial with pre- and post-design. The subjects were recruited from Alva's Homoeopathic Medical College and Hospital. After obtaining legally signed written consent, from all male and female participants, aged 20 to 28 years. Participants were screened and recruited through inclusion and exclusion criteria, and those who were willing to participate. Subjects under any medications or any psychiatric medicines, subjects who had participated in another clinical trial in the previous 6 months and practising yoga for the past 6 months were excluded from the study. The present study was registered in the Indian clinical trial registry (CTRI Registration number – CTRI/2024/10/075716)

Ethical Considerations

The study's purpose and the participants' rights as research subjects were explained to them. Each subject received enough

time to read the information sheet and have all of their enquiry. It was explained to them that they had the right to leave the study at any moment and that they had to be willing to take part voluntarily. By signing an informed consent form, each subject indicated their willingness to take part in the study. The institution's ethical committee has approved the project with the ethical clearance registration certificate no. ACNYS/IECHS/2022/72. The Alva's College of Naturopathy and Yogic Sciences' ethical committee authorized the study. (Figure 1)

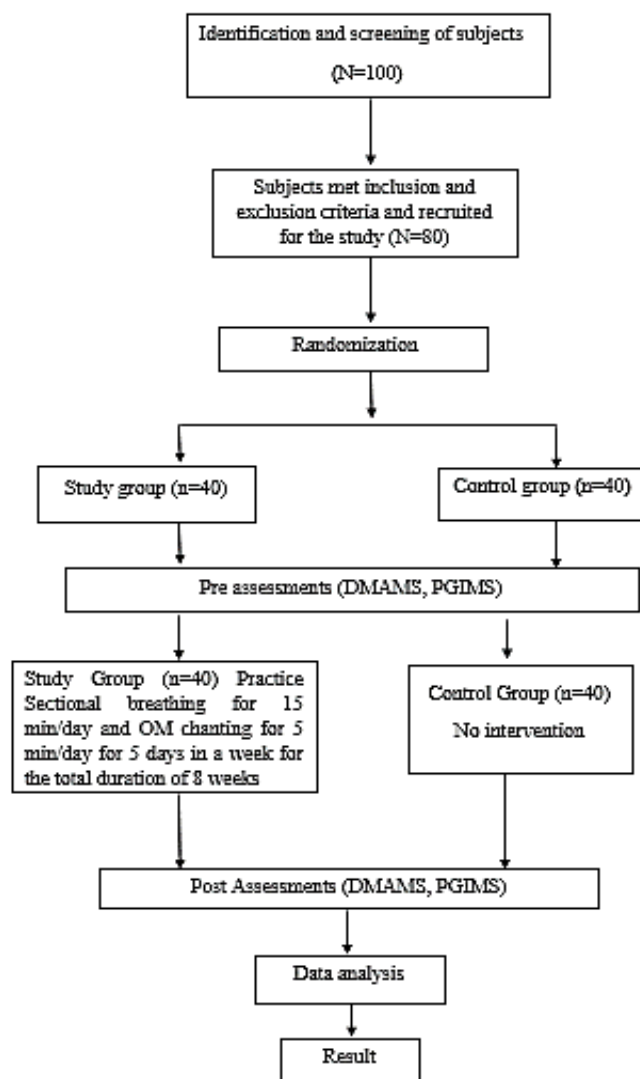


Figure 1: Illustration of study plan

Assessments of Parameters

PGI Memory Scale (PGIMS): The PGI Memory Scale (PGIMS) questionnaire is a standard and reliable measure of memory with norms for adults between 20 and 45 years. Ten subtests are included in it: verbal retention of similar and dissimilar pairs, visual retention and recognition, mental balance, attention and concentration, delayed recall, immediate recall, remote memory, and recent memory. These subtests measure different aspects of memory and employ different methods of recall [14 - 16].

Deo – Mohan Achievement Motivation Scale [DMAMS]:

Deo – Mohan achievement motivation scale is a standardized scale for assessing the level of achievement motivation. The scale includes fifty items about academic challenges, achievement anxiety, the need for achievement, motivation for achievement, the importance of grades, the relevance of school or college to future goals, attitudes toward education etc. The self-rating scale consists of 5 points: always, frequently, sometimes, rarely, and never [17].

Intervention**Sectional breathing (Vibhaga Pranayama):****1) Abdominal Breathing (Adhama)**

The patient was asked to sit in any meditative posture either sukhasana, vajrasana or padmasana. Patient was asked to keep their eyes closed during the practice. Inhalation by bulging out the abdominal muscles and exhalation by drawing back the abdomen inwards was advised to the patients.

2) Thoracic (Chest) Breathing (Madhyama)

The patient was asked to sit in any meditative posture. They were asked to keep their eyes closed during the practice. Inhalation by expansion of the chest muscles and exhalation by returning the chest to its normal position followed. This procedure was repeated for 10 rounds.

3) Upper Lobar or Clavicular Breathing (Adhya)

The patient was asked to sit in any meditative posture. They were asked to keep their eyes closed during the practice. Inhalation was done to raise the collarbones and shoulders upwards and backwards, and exhalation was done by lowering down the collarbones and shoulders to its normal position. This procedure was repeated for 10 rounds.

4) Full Yogic Breathing:

The patient was asked to sit in any meditative posture. They were asked to keep their eyes closed during the practice. In this practice, all the other three types of breathing will be combined. Inhalation was done in the following sequence - abdominal breathing, thoracic breathing and clavicular breathing and exhalation was done in sequence as inhalation. Patients were asked to perform it at a frequency of 4 breaths per minute. The steps of the sectional breathing mentioned above are repeated with awareness for 10 rounds. The whole practice was completed in 10 minutes [18].

Om Chanting

Patient was asked to sit in Sukhasana. They were asked to keep their eyes closed during the practice. OM mantra was chanted continuously during deep inhalation and exhalation. Patient was asked to continue OM chant until further exhalation is not possible [19].

Statistical Analysis

The subjects were allocated into two groups with 40 subjects in each of the two groups: experimental and control groups. Univariate analysis of variance was performed to assess the changes between the groups after adjusting for age and gender. A non-parametric test, the Wilcoxon Signed Rank test, was used to assess within-group changes in both groups.

RESULTS

Mean \pm SD values measured before and after the intervention in experimental and control groups are described in Table 1. The level of significance is fixed at $p \leq 0.05$. Wilcoxon signed-rank test was performed for within-group comparison.

Table 1: Table representing group averages in Mean \pm SD before and following the intervention.

Variable	Experimental Group			Control Group		
	Pre	Post	p-value	Pre	Post	p-value
DMAMS	130.27 \pm 25.21	138.13 \pm 25.29*	$P \leq 0.05$	140.1 \pm 24.29	140.33 \pm 24.42	NS
PGIMS	80.43 \pm 8.3	86.8 \pm 8.06*	$P \leq 0.05$	85.2 \pm 5.52	85.35 \pm 5.55	NS

NS: Not significant, * $p \leq 0.05$: Between-group comparison using univariate ANOVA after adjusting for gender and respective baseline value.

PGIMS: Homogeneity of variance using Levene's test for equality was met. Bonferroni test for multiple corrections was made. There was a significant reduction in PGIMS scores in both the groups $F(4,75) = 8033.73$, $p \leq 0.05$, $\eta^2 = 0.31$ and also between the two groups following the intervention $F(4,75) =$

665.2, $p \leq 0.05$, $\eta^2 = 0.99$ (Figure 2). Gender did not significantly influence the scores $F(4,75) = 0.95$, $p = 0.33$, $\eta^2 = 0.002$. Wilcoxon signed rank test for within-group comparison showed significant improvement in PGIMS score in the experimental group ($p \leq 0.05$).

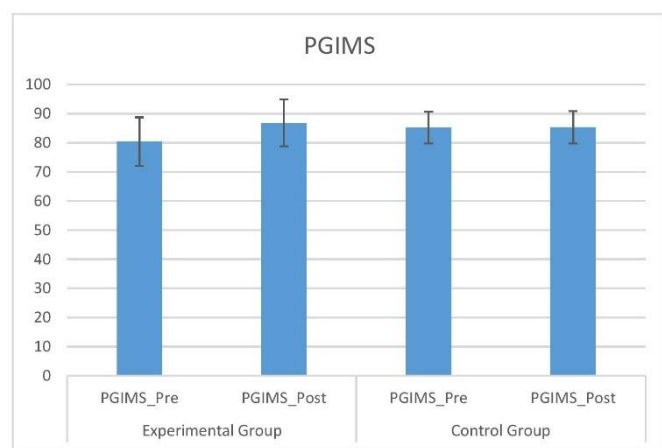


Figure 2: Graph showing in between group changes pre and post experimental and control of PGIMS scores.

DMAMS: Homogeneity of variance using Levene's test for equality was met. Bonferroni test for multiple corrections was made. There was a significant reduction in DMAMS scores in both the groups $F(4,75) = 6515.1$, $p \leq 0.05$, $\eta^2 = 0.99$ and also between the two groups following the intervention $F(4,75) = 1523.28$, $p \leq 0.05$, $\eta^2 = 0.95$ (Figure 3). Gender did not significantly influence the scores $F(4,75) = 1.6$, $p = 0.21$, $\eta^2 = 0.021$. Wilcoxon signed rank test for within-group comparison showed significant improvement in DMAMS score in the experimental group ($p \leq 0.05$).

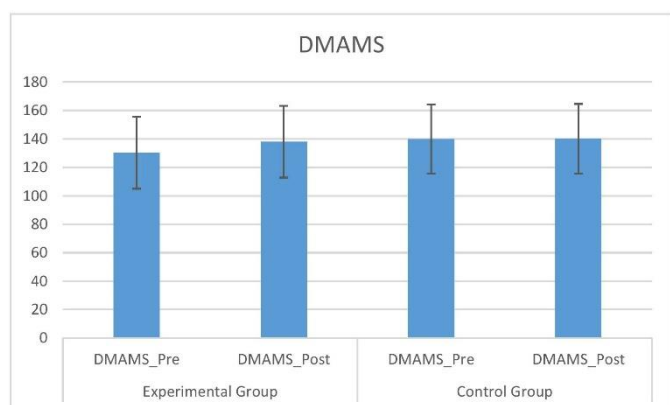


Figure 3: Graph showing in between group changes pre and post-experimental & control of DMAMS scores.

DISCUSSION

The present study investigated the combined effect of Sectional breathing and OM chanting following an 8-week intervention on Motivation and Memory among healthy individuals. The findings suggested that intervention is effective in improving the motivation and memory of the subjects in the experimental group.

A previous study was done by Imran Khan Niazi et al on the EEG signature change during unilateral yogic nasal breathing which is a type of yogic breathing practice, from the study it was found that dominant airway unilateral nose breathing is linked to changes in the frontal and parietal left hemispheres of the brain while non-dominant breathing has diffuse bilateral

effects in the posterior and central cortices [20]. GS Thakur et al in their study have mentioned that the Left hemisphere (LH) lobe of the cerebral cortex of the brain is responsible for recalling numerical, descriptive, and analytical data. The temporal lobe registers and encodes incoming stimuli, which are then stored in the parietal lobe. This study suggests that LNB (Left Nostril Breathing), either alone or as alternate breathing, can improve the refresh rate of the left hemisphere through ipsilateral nostril breathing. This may improve the efficiency of the contralateral RNB (Right Nostril Breathing) effect on the LH, allowing for faster changes to the neural circuit and concluded that yogic nostril breathing practice increases the memory performance of the subjects [21].

Varsha Singh et al in their study, had proposed an intriguing link between working memory and yogic breathing due to the role of the respiratory component in the phonological loop of verbal working memory tasks [22]. The study suggests that yogic breathing techniques may enhance working memory performance. This has implications for individuals seeking to improve their cognitive abilities, particularly in tasks that require verbal memory and retention. The findings of the study could inform practical applications in various fields, such as education, where incorporating yogic breathing exercises could help students improve focus, memory, and overall academic performance [22].

In a narrative review, it was mentioned that deep diaphragmatic breathing improves cognitive function by increasing the amount of oxygen reaching the brain. Deep diaphragmatic breathing increases oxygenation levels in the prefrontal cortex, a critical area for cognitive processes. Increased oxygen availability can improve attention, concentration, and mental clarity. It was also mentioned that variations in breathing patterns may impact cognitive outcomes by affecting brain activity, neurochemical levels, and cerebral blood flow. Another mechanism mentioned in his paper is that respiration affects cerebral blood flow, which is necessary for delivering oxygen and nutrients to the brain, as done in the studies using functional magnetic resonance imaging (fMRI). Changes in breathing rhythms can cause shifts in the distribution of blood flow within the brain, significantly affecting cognitive performance. Slow breathing has been shown to increase blood flow to the prefrontal cortex (PFC), leading to improved cognitive control [23].

In another study by Xiao Ma et al, it was proved that diaphragmatic breathing may influence cognitive performance by primarily affecting the autonomic nervous system. It has also been shown that slow breathing is linked to an increase in the activity of the prefrontal cortex (PFC) which is important for cognitive control and decision-making [24]. These similar mechanisms can be applied in our study that Sectional breathing can improve memory by increasing the Prefrontal cortex activity, which is essential for cognitive control and performance and also increasing the blood flow to the

Prefrontal cortex and also affecting the cerebral blood flow which is necessary for supplying oxygen and nutrients to brain and then it leads to improvement of memory.

A study was done by Aalasyam Naveen *et al.* on 20 healthy volunteers with an age range of 25–55 years to evaluate the effectiveness of 12-week Om chanting on reaction time and spatial and verbal memory. It was concluded that giving Om chanting as the intervention had made significant improvement in the spatial and verbal memory scores and auditory and visual reaction time by stimulating brain areas responsible for cognitive functions [25]. K L Naidu *et al.* in their study, concluded that 12 weeks of OM chanting intervention in school children gives beneficial effects on memory due to changes in the energetic structure of the mind by the vibrations produced during OM chanting [26]. With this similar mechanism, OM chanting helps to improve the PGIMS scores and, in turn, improves the memory of the participants in our study.

In an another study done by Dibyendu Mondal *et al.* on evaluating the effect of yogic practices on depression and sports achievement motivation among 80 female college students of 19 to 22 age range, it was found that yogic practices which includes OM chanting and pranayama which is a yogic breathing practices, improves the sports achievement motivation and also reduces the symptoms of depression on the college students through proper mind-body training and improvement of autonomic function by activating neurohormonal mechanisms [27]. This similar mechanism of improvement of autonomic function by neurohormonal activation support our study in improving the motivation of the participants of our study.

The limitation of the study is the small sample size and short range of age groups. Further research could be conducted with a large sample size and a vast range of age groups to assess the effect of Sectional breathing and OM chanting. Such studies require advanced techniques and a longer intervention period than previous studies.

CONCLUSION

The present study concluded that the practice of Sectional breathing and OM chanting for 8 weeks in healthy subjects has been shown to have a positive influence in improving the motivation and memory of the subjects. Hence Sectional breathing and OM chanting can be considered as one of the effective yogic practices for the improvement of motivation and memory.

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