



## RESEARCH ARTICLE

### UNVEILING THE IMPACT OF THE 4-7-8 BREATHING TECHNIQUE ON CONCENTRATION, MEMORY AND ANGER AMONG PHYSIOTHERAPY STUDENTS - A RANDOMIZED CONTROLLED TRIAL

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#### ABSTRACT

**Background:** The academic success of students relies on their ability to concentrate and remember information, with memory serving as a vital repository of experiences and knowledge. Concentration and memory are two important aspects in a student's life. Each student shall have knowledge about improving their techniques. Without classroom concentration, students cannot memorize the subject matter. Even a student has good concentration, without memory, it may not be useful. Memory is an essential part of the studying skills which students will need in their transition from their schools where they have a few and limited information to the university where there are lots of sources and books which can be almost unlimited. Anger, a complex emotional state, can significantly impact students' classroom engagement and behavior. 4-7-8 breath is a new breathing technique, in which the numbers 4-7-8 refers to counts of inspiration, holding the breath and expiration respectively which overcomes the expiratory defect. The aim of the study was "To check the effectiveness of 4-7-8 breathing technique on concentration, memory and anger in physiotherapy students". **Methods:** A randomized controlled trial was done with total of 52 participants, comprising college-level male and female students from Shrimad Rajchandra College of Physiotherapy, were selected for the study based on predetermined inclusion and exclusion criteria. They were divided into two distinct groups: a controlled group and an experimental group. Both groups were instructed to complete a pre-data form. Subsequently, the experimental group engaged in a breathing technique utilizing the 4-7-8 method for a duration of 5 days, three times daily. Following this intervention, post-data forms were collected for comparative analysis. **Result:** A total of 52 participants were screened for comparison between experimental and control group. Normally testing was done which showed that data was following normal distribution hence oneway ANOVA test was used for analysis. The study found that implementing the 4-7-8 Breathing technique did not result in significant improvements in concentration, memory, or anger control among college physiotherapy students over a five-day period. ( $p>0.05$ ). **Conclusion:** Based on the research findings, it was evident that the 4-7-8 Breathing technique may not be beneficial for college-going students in improving concentration, memory, and anger control, though the intervention had been implemented for 5 days. This could be a limiting factor towards the outcomes achieved. Therefore, physiotherapists/clinician utilizing this technique may consider extending its duration, as this may potentially yield positive results.

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## INTRODUCTION

Academic performance is a complex process that is influenced by several factors, such as study habits. Study habit is a diverse individual behavior in relation to studying, and is a combination of study methods and skills.<sup>1</sup> In other words, study habits include behaviors and skills that can increase motivation and convert the study into an effective process with high returns, which ultimately increases the learning.<sup>1</sup> This skill is also defined as any activity that

facilitates the process of learning about a topic, solving the problems or memorizing part or all the presented materials. The academic success of student depends mainly on the Level of concentration in the classroom and memory. Concentration and memory are considered as sisters.<sup>1</sup> Without classroom concentration, students cannot memorize the subject matter. Even a student has a good concentration, without memory it may not be useful. Percentage of males was 68% and the percentage of females was 32%. About studying hours, we found that 59.2% students' study less than 3 hours, 25.2% students' study between 3–6 hours and 15.5% students' study

more than 6 hours.<sup>2</sup> The mean score of the students for concentration skills was 36.45 and was 32.40 for memory skills. Regarding concentration skills 35% students had non adequate score and 65% students had adequate score, regarding memory skills 28.2% students had non adequate score and 71.8% students had adequate score.<sup>2</sup> There is a statistically significant association between concentration skills and studying hours and there is statistically significant association between memory skills and studying hours.<sup>3</sup> Concentration is the ability to focus and give undivided attention on a single task by ignoring all other distractions. As per Hartley and Davis, average attention span of adult is 10–15 minutes. Reading, learning, and thinking take place through prolonged concentration. Concentration will help the students to complete the task in shorter period and helps to reduce error.<sup>3</sup> Memory is an essential part of the studying skills which students will need in their transition from their schools where they have a few and limited information to the university where there are lots of sources and books which can be almost unlimited.<sup>3</sup> Memories are the mental ability to store and recall sensations, impressions and ideas. The ability of students in the classroom is influenced by their mental strength and memory in remembering lessons and expressing in class in channeling ideas and creations in their minds. Memory is knowledge acquired so that it can be recalled later.<sup>4</sup>

High levels of depression can affect memory performance, decrease memory, and interfere with concentration. Explicit memory and various forms of implicit memory involve short-term memory, which lasts a few seconds to hours, and long-term memory, which stores memories for years and sometimes for life. Working memory is a form of memory short term that keeps information available, usually for a very short time.<sup>4</sup> Depression is avoided by students but one of the mental symptoms caused by pressure and other social factors has become a common thing in the school, attacking students quickly and torturing them until their thinking power slows down.<sup>4</sup> The existence of memory disorders that attack students can cause them not to be in a good emotional state when facing pressure, they tend not to be able to present results response and short-term memory that suddenly disappears due to depressed thoughts causing blank face with a good memorizing technique.<sup>4</sup> Three common memorizing techniques which are the repetition (read or study repeatedly), visualization, and association, have shown in improving memory.<sup>4</sup> Working memory is the term used to refer to a brain system responsible for temporarily storing and manipulating information. It functions as a mental workspace which can be flexibly used to support everyday cognitive activities. Performance on higher level cognitive tasks such as problem solving, reasoning and reading is more accurately predicted by performance on working memory tasks compared to performance on short term memory tasks.<sup>5</sup> Altogether 157 students were given questionnaires that consisted of two sections which contained demographic data and working memory standard test such as Visual Working Memory Test and Arithmetic Test. Most of the students had the medium level of working memory score (40 % to 70 %). Almost 24 % students had excellent working memory score (exceeds 70 %) while 17 % students scored poorly (less than 20 %) in the tests.<sup>5</sup> Anger is an emotional state that consists of feelings that vary in intensity from mild irritation to fury and rage. Anger may also be provoked when a friend's question did not get the necessary attention. In short, it is assumed that the common denominator of all the situations in which anger is

evoked is that personal values, including those of fairness and justice, have been assaulted. In school, students may get angry for a variety of reasons. For example, when they are reprimanded by the teacher, when they are forced to do something they do not want to do, or when they are not allowed to do something they want to do. Most teachers see anger as an emotional response that may lead to disruptive and inappropriate behavior.<sup>6</sup> Anger is one of the most prevalent behavioral problems among the youth and those around them.<sup>7</sup> Anger-in is defined as the tendency toward thought suppression and hostile behaviors aimed at the ego and self and is shown as negative emotions such as depression and guilt.<sup>8</sup> Anger-out is often expressed as direct or indirect physical or verbal aggressive behaviors toward people or objects.<sup>8</sup> Some theorists believe that anger is a maladaptive attempt at coping with a stressful environment, resulting in greater conflict and personal discomfort. When anger is suppressed and not let out, it can be an underlying factor for anxiety and depression. Anger can be linked to problems such as alcohol and substance abuse, emotional and physical abuse, crime, loss of concentration, poor sleeping patterns, and self-harm. Anger management training can decrease the aggressive behavior of at-risk students in the short-term. Based on the data, 70% of students (111 students) admitted that they have bad temper on an 'occasional' basis.<sup>7</sup>

Deep breathing increases the supply of oxygen to the brain and is thought to stimulate the parasympathetic nervous system, which promotes a state of calmness. Students reported having less test anxiety, less nervousness, and better concentration after a semester of engaging in deep breathing in class.<sup>9</sup> 4-7-8 breathing exercise focuses on inspiration followed by a hold which allows collateral channels to open up and expand.<sup>2</sup> In 4-7-8 breathing technique, by exhaling for a count of 8, patient expelled more CO<sub>2</sub> from lungs and it is reducing anxiety and depression. The slow breathing pattern increases collateral circulation and improves oxygenation that signals the brain to release GABA, which reduces anxiety and depression.<sup>10</sup>

### Need of the study

- There is a noticeable decline in concentration, memory, and a rise in anger issues among university students.
- The study aims to implement interventions to improve cognitive functions like concentration and memory.
- It also focuses on developing strategies to effectively manage and reduce student anger issues.
- The expected outcome is to help students gain better focus, memory, and emotional control.
- Ultimately, the research seeks to enhance students' academic performance and overall well-being.

### Methods

**Source of Data:** Students of Shrimad Rajchandra college of Physiotherapy, UTU, Gujarat.

**Method of Collection of Data:** Participants were approached from Shrimad Rajchandra College of Physiotherapy for data collection.

**Study Design:** Randomized Controlled Trial.

**Sample Size:** Sample size: sample size was calculated using G power version 3.1.9.4 with effect size of 0.80 (large),  $\alpha = 0.05$ ,

power = 0.85 and allocation ratio was 1. Total sample size was 48 and assuming 10% dropout so finalized sample size is 52.

**Study Population:** Bachelor of physiotherapy students.

**Sampling Method:** Simple Random Sampling.

**Materials used:** Chair, Pen, Paper, Record Sheet, Stopwatch, Questionnaire sheet.

**Inclusion Criteria:** Age-18-24 years physiotherapy students, Both male and female candidates, Only BPT students, Willing to receive treatment.

**Exclusion Criteria:** Unstable Angina, Uncooperative Individuals, Individuals with spinal deformity and respiratory muscle dysfunction, Students with already diagnosed disorder of Cardio-Vascular system, Neurological condition, Endocrine system, Respiratory, Digestive system, History of smoking and alcohol consumption, Symptoms of Orthostatic hypotension, Carcinoma, Psychological disorder.

**Interventional Protocol :** 4-7-8 breathing technique, the patient was asked to sit in a comfortable position with hands on lap, press the tip of the tongue on the ridge of tissue behind the top, front teeth and keep it there throughout the breathing cycle, breath in deeply through the nose for 4 counts, hold the breath for 7 counts and then breath out slowly through the mouth for 8 counts and repeat the breathing cycle.<sup>10</sup> Dosage would be 3 session per day, 10 repetitions per session and 5 days a week for 1 week.

#### Outcome Measures

- The Mizan meta-memory and Meta concentration Scale for Students (MMSS)12
- Multifactorial Memory Questionnaire(MMQ)13
- Multidimensional Anger Inventory (MAI)14

**Procedure:** This study recruited 18–24-year-old males and females, excluding those with unstable angina, spinal deformities, respiratory muscle dysfunction, and pre-existing cardiovascular, neurological, or endocrine disorders. Approval was obtained from the Research Ethics Committee prior to the commencement of the study. Participants received an explanation of the 4-7-8 breathing technique, and data was collected using standardized scales (MMSS, MMQ, and MAI) after obtaining informed consent. Data analysis was performed using IBM SPSS version 23, leading to results and conclusions based on the collected data. Normality testing was conducted and the values ( $p > 0.05$ ) suggested that the data was normally distributed.

## RESULTS

Table 2 describes the between group Compression of MAI, MMSS and MMQ for post intervention measurements and the values are suggesting that there is no significant difference in between group comparison. Table 3 is the output of One Way ANOVA analysis which again is describing non-significant difference in tested parameters after the intervention. The values are simply explaining that both intervention and the control groups are showing similar features of memory, concentration

and anger. Hence any beneficial effect of the intervention was not achieved in the intervention group.

**Table 1. Descriptives of age and gender in both the groups**

Group No.	Group Name	Total Students	Total No. of Males	Total No. of Females	Age Mean $\pm$ SD
1	Experimental Group	26	12	14	18.81 $\pm$ 1.021
2	Control Group	26	8	18	19.08 $\pm$ 1.468

**Table 2. Between Group Compression of MAI, MMSS and MMQ**

Group	Experimental group (Mean $\pm$ SD)	Control group (Mean $\pm$ SD)	Sig.
Post-MAI	104.50 $\pm$ 19.381	109.08 $\pm$ 24.771	.462
Post-MMSS	30.77 $\pm$ 6.389	29.77 $\pm$ 7.044	.594
Post-MMQ	43.42 $\pm$ 7.920	40.46 $\pm$ 9.605	.231

**Table 3. Table of oneway anova**

Measure	Between Group Comparison	Sum of Squares	df	Mean Square	F	Sig.
MAI		272.327	1	272.327	.551	.462
MMSS		13.000	1	13.000	.287	.594
MMQ		114.019	1	114.019	1.471	.231

## DISCUSSION

A study on 52 physiotherapy students (aged 18–24 years) explored the effectiveness of the 4-7-8 Breathing Technique on concentration, memory, and anger. Despite previous research showing benefits in reducing anxiety, pain, and improving sleep quality, this study found no significant difference in outcomes between the experimental and control groups, suggesting that using this technique thrice a day, five times a week may not be effective for anger, memory, and concentration. It was concluded that about 75% of first-year medical students have adequate concentration and memory skills.

Among students who study for 3–6 hours daily, only 42.3% demonstrated adequate concentration skills and 57.7% showed adequate memory skills. Further studies with a larger sample size are needed to correlate concentration and memory skills with students' end-of-year average total scores. Additionally, previous research has concluded that the 4-7-8 breathing technique, which focuses on the timing of inspiration, holding, and expiration, is effective in reducing dyspnea, anxiety, and depression in patients with moderate chronic obstructive pulmonary disease.

#### Limitations

- Age Group: Limited to 18-24 years, may not generalize to other age groups.
- Short Duration: Intervention period might be too brief to capture significant effects.

## CONCLUSION

The 4-7-8 Breathing technique may not be effective in improving concentration, memory, and anger control among college students after just 5 days of use. The short duration of the intervention could limit its impact. Extending the technique's duration may yield better results. Physiotherapists and clinicians should consider this for improved outcomes.

## Future Recommendations

- Environment: Conduct breathing technique sessions in quieter, more peaceful settings.
- Additional Variables: Explore impact on more variables, such as stress, anxiety, or overall well-being.

**Conflict of Interest:** None.

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