ASSESSMENT OF COGNITIVE LEVELS AFTER SHORT DURATION OF SLOW DEEP BREATHING BY RAVEN’S STANDARD PROGRESSIVE MATRICES

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ABSTRACT
Background: There is enough evidence where deep breathing, yoga and meditation have produced good results regarding memory, concentrating capacity, attention span and cognitive levels but when practiced for long duration. There is very little data available regarding their effects when practiced for short duration. Time management has a key role to play in our stressful and busy life.
Aims & Objective: To study the effects of slow deep breathing for short duration (5 min) on the cognitive levels.
Materials and Methods: 71 apparently healthy first year MBBS students participated in the study. Students not willing to participate were excluded from the study. Revan's Standard Progressive Matrices were used to assess the cognitive levels. It consists of five different levels A, B, C, D, and E. Each has twelve questions. Participants were made to solve the matrices before and after five minutes of slow deep breathing (six seconds of inhalation and six seconds of exhalation) Time they took to solve the matrices and their scores before and after slow deep breathing were noted. Data was analysed using students ‘t’ test.
Results: There is statistically significant improvement in the time they took to solve the matrices after slow deep breathing (13.63 ± 1.76 min) compared to basal values (26.70 ± 6.62 min). p value was 0.0001 for the ‘t’ value of 16.07. There is improvement in the scores after slow deep breathing (50.54 ± 6.28) when compared to basal values (50.25 ± 7.24) but is not statistically significant. p value was 0.71 for the ‘t’ value of 0.25.
Conclusion: Slow deep breathing even for short duration of five minutes is beneficial. Students can be advised for slow deep breathing for five minutes before starting any class for their better academic performance.
Key Words: Slow deep breathing; Revan's Standard Progressive Matrices; Cognitive Levels

Introduction

Today’s life is stressful life and this stress affects all classes from school children to undergraduates, post graduates and even working population. In many circumstances this stress is due to improper time management. Studies have reported higher perceived stress among students in healthcare courses including dental, medical and nursing courses.1

Well known distressing and anxiolytic techniques are slow deep breathing and voluntary muscle relaxation may be as distinct entities or as part of yoga and meditation.2

Slow deep breathing is technique where there is inhalation for six seconds and exhalation for next six seconds. In slow deep breathing there is maximum effort from the belly also during inhalation as well as exhalation.

Slow deep breathing helps in reducing the sympathetic nervous system activity and increasing the parasympathetic activity.3 This helps in calming the mind and thus reducing the anxiety and when anxiety goes down concentrating power naturally improves.

Deep breathing is found to have a positive impact on memory.4 Deep breathing has proved beneficial in auditory and visual reaction times.5 Deep breathing has consistently showed good results in improving the pulmonary functions also.6 Thus improving oxygenation to brain and rest of the body.

So in a nut shell, deep breathing is very beneficial to the nervous tissue. But there is very little literature regarding effect of deep breathing on cognitive levels. Off course yoga and meditation have given good results of improved cognition but when practiced for long duration.6

So present study has been taken up to know whether there is any effect of slow deep breathing for short duration on cognitive levels.

Materials and Methods

This was a cross sectional study. 71 apparently healthy first year MBBS students participated in the study. Students were called to the department in three different
batches and were briefed about the study design. Students not willing to participate were excluded from the study.

Revan’s Standard Progressive Matrices were used to assess the cognitive levels. It consists of five different levels A, B, C, D, and E. Each has twelve questions. So total of sixty questions and maximum of one minute was given to each question.[7]

Participants were made to solve the matrices before deep breathing which was taken as basal recording. Then they were made to slow deep breathe (six seconds of inhalation and six seconds of exhalation) for five minutes and were again made to solve the same matrices. This was taken as post deep breathing recording. Time they took to solve the matrices and their scores before and after slow deep breathing were noted.

Basal and post deep breathing recordings were analysed using students “t” test.

Ethical committee clearance was obtained for the study.

Results

The mean age of participants was 18 years. The mean duration of time they took to solve the matrices before deep breathing was 26.70 ± 6.62 and after deep breathing was 13.63 ± 1.76 minutes. There is statistically significant improvement in the time they took to solve the matrices. The mean scores of the matrices before deep breathing was 50.25 ± 7.24 and after deep breathing was 50.54±6.28. There is an improvement in the scores but not statistically significant. Results are shown in Table 1 and Figure 1.

| Table 1: Mean duration of time to solve the matrices and their scores before and after deep breathing |
|---------------------------------------------------------------|----------------|-----------------|-----------------|----------------|----------------|
| Mean duration of time to solve matrices (min) | Before deep breathing | After deep breathing | t value | p value |
| 26.70 ± 6.62 | 13.63 ± 1.76 | 16.07 | 0.0001 |
| Mean scores | 50.25±7.24 | 50.54±6.28 | 0.25 | 0.71 |

Discussion

Different types of breathing exercises have different effects on the body. It has been observed that fast breathing exercises like kapalabhati increase sympathetic tone and decrease parasympathetic tone and slow breathing exercises reduce sympathetic tone and increase the parasympathetic tone.[8] When sympathetic tone comes down, anxiety reduces. So practice of slow deep breathing is used as a treatment for anxiety disorders.[9] Therefore slow deep breathing is known to reduce the anxiety and calm down the person where as fast breathing is known to keep the person alert, active and vigilant by increasing the sympathetic tone.

Shirley Telles et al in their study have concluded that there will be improvement in the attention span immediately after high frequency yoga breathing.[10] In a similar study by Sheela et al there was improved sustained attention span in university students who were undergoing training of Integrated Yoga Module.[6]

Shalini Kollur in her study on students of grade 5 and 6, concluded that deep breathing has positive impact on memory and students felt more relaxed and could concentrate better after deep breathing.[4] In a study done by Sharma VK et al Pranayama practice for twelve weeks produced significant improvement in the cognitive functions in healthy volunteers.

Our study revealed that there is significant improvement in the time participants took to solve the matrices after slow deep breathing when compared to basal recordings. This indicates that participants were able to solve the matrices faster. It may be because of enhanced memory[4], enhanced reaction time[11], decreased anxiety[2,8] or may be sum of all the effects.

There was improvement in the scores also though not statistically significant. This shows that participants’ ability to think and analyse also improved. In other words there was cognitive improvement in the participants after five minutes of slow deep breathing.
Our study concludes that slow deep breathing even for a short duration of five minutes is beneficial. Though the exact mechanism is not known it may probably act by reducing the anxiety, increasing the memory, concentrating power, attention and also the cognitive levels. Therefore a small benefit one would get after five minutes of slow deep breathing might get added up each day if practiced regularly and systematically every day. So students can be advised to slow deep breathe for five minutes before any class, lecture, seminar or a tutorial session for their better academic performance.

**Limitation of the study:** The study has not found out the exact mechanism how slow deep breathing for short duration is beneficial. Our study is a basic attempt to know whether slow deep breathing for short duration of five minutes has any beneficial effects on cognition. Better studies are anticipated in future to know the exact mechanisms underlying.

**Conclusion**

Slow deep breathing even for short duration of five minutes is beneficial. Students can be advised for slow deep breathing for five minutes before starting any class for their better academic performance.

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