Effect of *Nadi Shuddhi Pranayama* on concentration of students

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Abstract:

Students complain about decreased perception of subject due to lack of concentration and stress, which leads to low scores. *Nadi shuddhi pranayama* (NSP) is a yogic exercise that helps to increase concentration. This proposed study aims to see the effect of NSP on concentration of the students. 60 students of I BAMS underwent a series of 20 lectures. First 10 days, students were taught with traditional method. Next 10 days, NSP was done by students at the beginning of each lecture for 3 minute. Pre test and post test was taken in the form of multiple choice questions (MCQs). Feedback was taken after post test. We found that students who practiced NSP maintain better concentration in academics. MCQ score is significantly increased when post score was compared against the pre test score with paired t test ($p < 0.0001$). Feedback score based on 5 point Likert scale analyzed with Kruskal-Wallis test expressed feeling of relaxation and increase in concentration by performing NSP. NSP improves the concentration of the students, enhances the learning process, and helps students to minimize the stress and improve academic performance.

Keywords: Concentration, Nadi shuddhi pranayama, Stress.

Introduction:

Every teacher considers his classroom as battleground. His success lies in what he conveys in the classroom, but students' attention is also needed for most of his success. There are many students who complain about lack of concentration despite of having good

intellectual capacity (1). Due to lack of concentration students are mentally not present in the classroom. Stress is one more common problem in the students which can trigger mental health problems in them (2). Less perception of the subject due to lack of concentration and stress leads to poor score in the examination. Cognitive reactions of stress result in the inability to concentrate and hamper students' performance (1).

Learning is a multidimensional and dynamic process requiring a stress free and relaxed environment. Flooding of mind with unnecessary thoughts which causes hindrance to learning process should be eliminated. Students' attention and interest need to be at the maximum level to make optimum use of his/her learning ability. It is widely accepted that students of medical colleges can be stressed (3-4). In one hour lecture students cannot concentrate continuously for more than 30 to 40 minutes. Keeping student's attention is a major problem teachers have to face. Some meditation techniques require intensive training and longer duration, hence cannot be practiced into the regular classroom teaching. However, there are some simpler techniques that could be incorporated in the classroom environment just before a learning session to help students to reduce distractions, to concentrate and focus on the learning sessions.

Pranayama or the breathing technique is the *yogic* art of breathing and it is basic to any *yoga* exercise. One such technique involves breathing alternately through the left and right nostril. Traditionally this practice called NSP is believed to help increase in concentration. Improvement in academic performance and alertness has been reported in several *yogic* studies (5). Hence the present study is planned to explore a simple technique known as NSP to improve concentration of the student, could be a preferred modality in such a condition.

Aims:

1. To improve the academic performance of the students.

2. To minimize stress during the learning process.

Objectives:

1. To improve the concentration of student in the classroom.
2. To enhance the learning process with the help of NSP.

Material and Method:

This experimental study was conducted on 60 students of first B.A.M.S. after seeking permission from institutional ethical committee. Clear idea of the research project was given to all the students and consent was obtained from the students willing to participate in project.

Intervention:

The group under study consists of 60 students of I BAMS. For the first 10 days, all 60 students were taught the topic *vata dosha* with traditional method without performing NSP. Then MCQ test was carried out. Then with the same 60 students, a series of 10 lectures was arranged to teach the *pitta dosha*, but now NSP was done by students at the beginning of each lecture for 3 minutes. Then MCQ test was carried out. 15 MCQs were decided for each test. Thus single group of 60 students had given test before performing NSP (pre test) and after performing NSP (post test). Feedback was taken after post test for qualitative data.

Procedure of performing NSP:

While performing NSP one has to sit in a comfortable cross legged position, spine should be straight, shoulders should be down, and relaxed. Head should remain centred between the shoulders, chin should be tipped slightly downward, and eyes must be closed. Before starting NSP, patency of nostril should be checked to find out predominant nostril which provides maximum air entry to start the first inhalation of NSP. Use the thumb and ring finger of your right hand, the index and middle fingers can rest gently on your forehead to avoid strain in the neck and shoulders. Use your thumb to close off the right nostril and take breathe from the left nostril. As soon as you reach the top of the inhalation, immediately

close the left nostril with your right ring finger, removing thumb from the right nostril and at the same time start a slow, rhythmic, effortless exhalation through right nostril. Close the right nostril with your right thumb and exhale through the left nostril (6-7). This has to be followed consecutively for 3 minutes.

Feedback questionnaire:

A feedback questionnaire was prepared with the help of visual analogue scale. Questionnaire was compromised of items asking students to rate their level of agreement on five point Likert scale. Outcomes were evaluated using a five point scale ranging from strongly agree (SA=5), agree (A=4), undecided (UD=3), disagree (DA=2), strongly disagree (SDA=1). In addition to the questionnaire four open ended questions were asked about the benefits and drawbacks of NSP as an educational tool.

Assessments:

Data obtained from pre and post MCQ test score was analyzed by Paired student - t test. Qualitative analysis of concentration was done on the basis of feedback given by students before and after NSP. The response to open ended question about the experiences after performing NSP was analyzed by qualitative methods by categorizing the responses in various domains.

Results:

MCQ score is significantly increased when post score was compared against the pre test score with paired student - t test. The students' concentration improved significantly due to NSP ($p<0.0001$) (Table 1 and Fig. 1) and score of feedback also (Table 2 & 3 and Fig. 2 & 3).

This feedback highlighted that students found NSP very helpful for maintaining concentration with overall understanding of the topic and also to enhance the learning process. The students were satisfied and glad with NSP and suggested that every lecture

should begin with NSP. Students expressed a feeling of relaxation and learning atmosphere after performing NSP (Table 4).

Table 1: Pre and post test score of the students

Paired t test	Pre test	Post test	t = 11.76 df = 59
Number of students	60	60	
Mean	7.833	11.68	p < 0.0001
Std. Deviation	2.188	2.354	
Std. Error	0.2824	0.3039	which is highly significance.

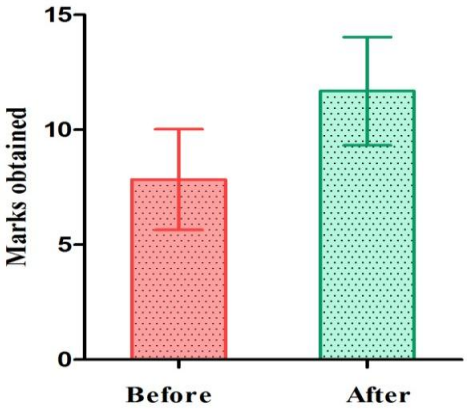

Figure 1: Comparison of students score before and after performing NSP

Table 2: Feedback analysis on the basis of 5 point Likert scale

Question no.	Q. 1	Q. 2	Q. 3	Q. 4	Q. 5	Q. 6	Q. 7	Q. 8	Q. 9	Q. 10	Q. 11	Q. 12	Q. 13	
Number of values	60	60	60	60	60	60	60	60	60	60	60	60	60	Kruskal -Wallis test statistic 101.3 P<0.0001
Median	5	5	4	4	4	4	4	4	4	4	4	4	5	
Mean	4.55	4.62	4.18	4.00	4.03	4.15	4.43	4.18	3.92	4.33	4.17	4.05	4.72	
Std. Deviation	0.53	0.49	0.62	0.76	0.66	0.73	0.50	0.77	0.79	0.63	0.85	0.65	0.45	
Std. Error	0.07	0.06	0.08	0.10	0.09	0.09	0.06	0.10	0.10	0.08	0.11	0.08	0.06	

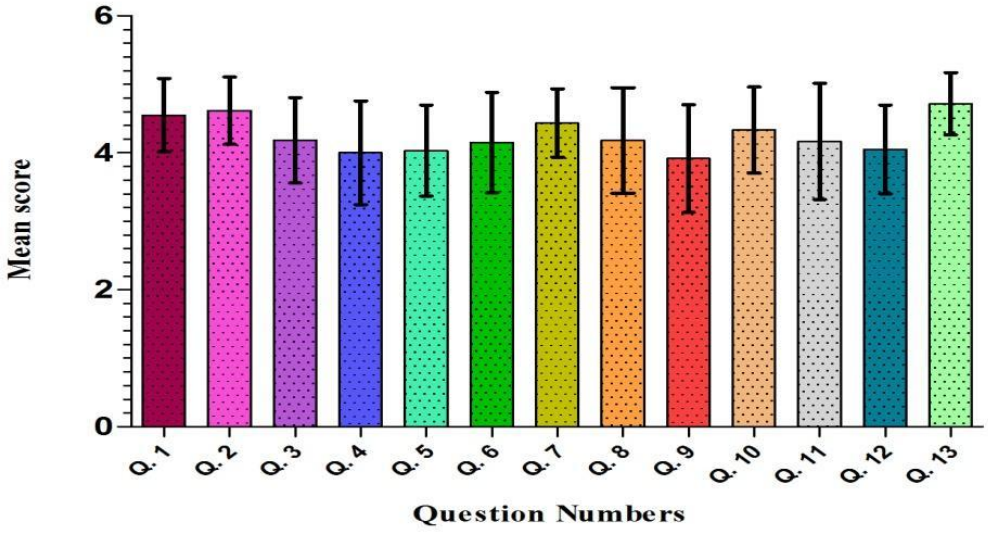

Figure 2: Relationship between question and mean score

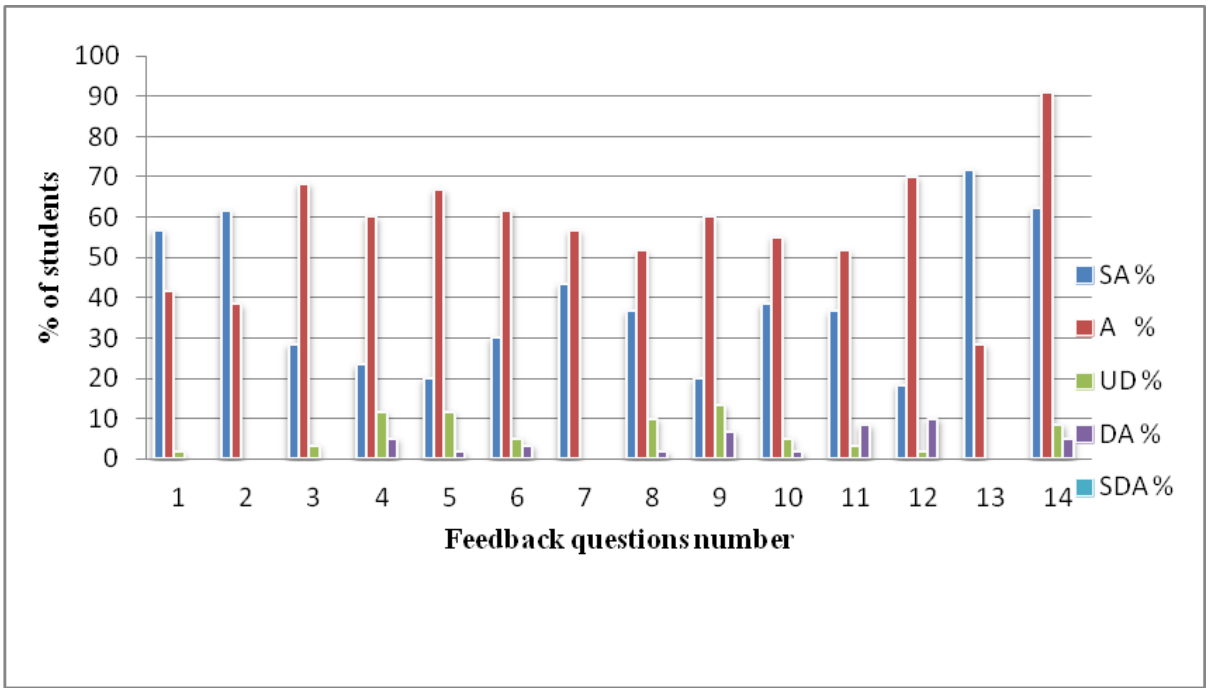

Figure 3: Feedback of students' perception on questionnaire

Table 3: Analysis of percentage of student's feedback

Feedback analysis (n=60)						
Q. No.	**Questions**	**SA %**	**A %**	**UD %**	**DA %**	**SDA %**
1	The clear idea about Nadi Shuddhi Pranayama (NSP) is given to me.	57	42	2	0	0
2	Nadi Shuddhi Pranayama (NSP) is easy to perform.	62	38	0	0	0
3	NSP is increase in concentration during lecture.	28	68	3	0	0
4	NSP is helpful in grasping the subject's knowledge.	23	60	12	5	0
5	Students enhance the learning process with the NSP.	20	67	12	2	0
6	NSP shows positive effect on memorization.	30	62	5	3	0
7	NSP induces feeling of peace and calmness of mind.	43	57	0	0	0
8	NSP helps to remove mental stress and worries.	37	52	10	2	0

9	You feel relaxed after lecture.	20	60	13	7	0
10	Students are interested to perform NSP before the start of each lecture.	38	55	5	2	0
11	Three minute time is sufficient for performing NSP.	37	52	3	8	0
12	Time given to complete the feedback is adequate.	18	70	2	10	0
13	It is possible to perform NSP at home also.	72	28	0	0	0

Table 4: Qualitative analysis of student responses showing main domains of experience after *Nadi Shuddhi pranayama*

Main Domains	**Sub-Domains and the responses**
General feeling and advantages after Nadi Shuddhi Pranayama	**Concentration of mind and relaxing experience** - NSP improves concentration and reduce tension. It made our body and mind relaxed. It helps in reducing stress, felt energetic, controlling flooding of thoughts. It is more helpful in last lectures of the day. NSP is the best method to improve the students' grasping power.
Influence on learning process	Enhance learning process with the help of NSP. Concentration level was better than usual lectures, better controlling of mind power, could concentrate for longer duration. Sometimes I lost concentration during regular learning process. "I felt sorry, but could not concentrate more than 30 - 40 minute."
Difficulties during the exercise	At starting there is feeling of anxiety. Feeling of freckling movements in the particular organ when newly starting *pranayama*. Some time fill warm due to *pranayama*. There was no difficulty found during project because complete idea given about *pranayama*. It is very easy to perform. First I felt uncomfortable to start NSP in front of classmate. I never done this process before that. "If any type of mistake occurs or it had been done wrong manner then it can harms the human body." During NSP sometime I lost concentration due to wandering of mind.
Advantages in perspective of Students.	It helps to be calm and strengthens the nervous system. Regular practice helps to reduce stress. It improves mental health. It improves appetite. Induces feeling of peace. Felt threat less atmosphere which help for better learning process.

Suggestion	You can use other methods of *pranayama* also. "I think more time was required to perform *nadi shuddhi pranayama*." NSP should proceed at the starting of every lecture. NSP should be performed in the open and silent space. I think that is more helpful if doing early in the morning.

Discussion:

Students have lot of distracters during the learning process. They do not attend with complete concentration in the classroom. Most of the time, classroom teaching is monotonous and overloaded with study material. This results in interferences in learning process and distraction from further learning. Concentration of the learner is extremely important in learning process, but mind has an inherent nature of wandering. The students' concentration improved significantly due to NSP ($p<0.0001$). This may be due to *nadi shuddhi*, meaning cleansing *nadis* i.e. intellectual channels of the body cleared by removing cover of ignorance deposited on them (8). As per modern processing, sensory information at the thalamic level is facilitated during the practice of NSP (9). This breathing exercise balances our nervous system and encourages creative thinking by increasing amount of oxygen to our brain. It improves mental clarity, alertness and physical well being. It helps students to release tension and develop a relaxed state of mind. NSP also increases parasympathetic activity and lowers systolic blood pressure as well as respiratory rate (10). Because it charges the body with an increased supply of oxygen through the lungs, this oxygen oxidizes the waste impurities, mainly carbon dioxide in the venous blood. This process of purification is enhanced by an accompanying huge increase in expulsion of waste carbon dioxide from the lungs during exhalation. As a consequence, very little waste material remains in the blood. There is less need for the breath, as the flow to the lungs of blood for purification slows down. The heart and lungs are given extra rest.

Feedback analysis on the basis of 5 points Likert scale shows that most of the students agree or strongly agree with feedback questionnaire. As excessive stress affects overall academic performance negatively and the result is in tune with earlier studies, it is concluded that excessive stress is harmful to academic performance (11). Stress overloads our mental and physical resources and interferes with the effective use of our skills and thus, affects negatively on the performance (12-13). At the beginning of lecture by performing NSP students felt relaxed with calmness of mind during learning process. The students' qualitative analysis of feedback mentioned the influence of the technique on learning process with a wide range of responses ranging from excellent concentration to no effect on concentration. This study suggests that NSP technique module could become a regular feature in the learning process.

Conclusion:

NSP improves concentration of the students and enhances the learning process and helps students to minimize stress and improve academic performance. NSP is both feasible and cost effective and students can adopt it in routine learning methods.

Limitations:

This study was conducted on a small sample size. More research with more number of sessions by different teachers for different subjects is necessary in other educational institute to assess the role of this technique in health education. As the effects of NSP tends to be subjective and vary from person to person and time to time in the same person, so more work needs to be done in this direction.

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