

# Enhanced Wellbeing Amongst Engineering Students Through Nadi Shodhan Pranayama (Alternate Nostril Breathing) Training : An Analysis

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## Abstract

The state of wellbeing is determined by individual's Physical, Mental and Emotional health. This paper introduces the concept of pranayama (an ancient yogic technique that involves controlled deep rhythmic breathing). The underlying principle of pranayama is that the relation between emotion and breathing is two way i.e. not only emotions have affect on breathing but controlled rhythmic breathing has positive effects on emotions too. We selected a group of engineering students who volunteered to practise alternate nostril breathing i.e. Nadi Shodhan Pranayama (NSP) for three months. We applied the introspection (subjective observation) method of Psychology and analyzed the various traits related to wellbeing of the group on Likert's five point psychometric scale before and after applying this technique. We applied t-test for statistical investigation. We observed that 75% of the subjects gained in terms of Feeling Healthy, 80% in terms of memory recall, 75% in terms of mental stress relief and 90% in terms of physical relaxation. This amazingly simple and yet highly effective ancient technique of NSP may become part of their physical training routine to be followed regularly. The paper aims at spreading the awareness of this yogic technique on the wellbeing of all human beings in general and engineering students in particular.

**Key words:** Improved Wellbeing; Alternate Nostril Breathing; Nadi Shodhan Pranayama, Students.

Improved wellbeing is the combination of feeling good (including positive emotions such as happiness, contentment, interest and affection) and functioning well. We wanted to know the discernment of the students about wellbeing. We conducted a survey amongst the students, their parents and their teachers too to know their perspicacity about wellbeing. The students view was considered primarily where as the view of the parents and teachers was to endorse the view of students. The major aspects of improved wellbeing reported by the students after the survey were Feeling Healthy, Memory Recall,

Mental Stress Relief and Physical Relaxation. Feeling Healthy stands for freedom from corporeal disorder. If a student suffers any physical anarchy, he may neglect the study efforts and may not perform well in the examination. Memory power plays most important role for getting good grades in the examination. Hence achieving success in the examination may be indicative of student's wellbeing. Mental Stress is caused due to examination phobia and peer pressure as well, when they have to compete for anything. Also infatuation in adolescents and fear of rejection may play a vital role to enhance Mental Stress. Lack of physical

relaxation determines the performance in the workshop jobs or playground activities due to which they tend to experience fatigue and want quick relief from that. Also survey revealed that some students may hook on to drugs to attain state of wellbeing temporarily as they are not mature enough to differentiate between right or wrong. This may be due to their incorrect thinking and unawareness.

On basis of the survey reporting we decided the four parameters i.e. Feeling Healthy, Memory Recall, Mental Stress Relief and Physical Relaxation to determine the state of wellbeing of engineering students.

## Technique

Ancient yogic technique of alternate nostril breathing also known as Nadi Shodhan Pranayama (NSP) is able to create the feeling of being well and this aspect of NSP is explored analytically in this paper. How the subject feels well is a matter of self introspection and cannot be measured by any instrument as such. One of the ways to know the wellness feeling of the subject is to ask to report the state of mind based on selected subjective parameters such as Feeling Healthy, Memory Recall, Mental Stress Relief and Physical Relaxation before and after NSP training. It may look that the last parameter physical relaxation is a physical state and not a mental state but on deeper instructions it is found that a person may be physically tired but may report as physically relaxed when he is emotionally positive. For example if a person is about to receive a gold medal in front of his colleagues, he may report physically relaxed even though he may have travelled overnight without any sleep. However to the same person if he is attending a close relative in Intensive Care Unit of the Hospital may report physically worn out even if he had all the physical features of rest and comforts of air conditioned environment. It is interesting to note that all diagnostic tests are recommended by the doctor only when the subject first feels diseased in his being and consults the doctor. Based on these simple facts the authors decided to make the subject self introspection report on the above cited four parameters before and after NSP training and analysed the results to know the efficacy of this ancient technique of feeling well.

## Yoga

Yoga has a rich base to deal with physical as well as mental health. This is perhaps the reason that our Sages

used to lead a healthy and cheerful long life. If one practises yoga, one can surely notice how certain asanas affect one's mind and body. Some poses may be easy to attain and put our mind at ease, while other yoga poses are difficult and may even cause us frustration. These physical and mental feelings also help us in choosing the type of yoga that best suits us. Health disorders related to Blood Pressure, Heart, Lungs, Kidneys, Joints etc. are on the rise throughout the world [1]. It is well established fact that physical health is influenced by mental wellbeing and vice versa. Mental health is primarily more affected by negative emotions like lust, anger, infatuation, greed, pride, anxiety, fear, depression and inferiority complex [2]. Learning the management of these negative emotions is therefore essential to maintain good mental health. Yoga offers comprehensive solution for managing the negative mental emotions. It is an ancient Indian term signifying union of an individual with cosmic being. This is achieved by following various techniques in a disciplined way. The focus of this paper is on Pranayama (Controlled Yogic breathing). The underlying principle of Pranayama is that the relation between emotion and breathing is two ways i.e. not only emotions have effect on breathing but controlled rhythmic breathing have positive effects on emotions too.

## Pranayama

Breathing helps in maintaining the vital energy of life and thus in yogic terms this is known as Prana. The process of controlling the Prana is called Pranayama. So pranayama is the science related to invigorating the vital force supplying energy and controlling the mind-body complex. The ancient texts emphasise that retention of air, increases the level of prana (energy) in the body, it also regulates the flow of pranic energy through out the body. So pranayama helps to control most of the ailments and can also slow down the inevitable aging process of the body [3].

The mind influences most of the endocrine and other physical as well as the metabolic functions of the body including breathing. When the mind is calm and relaxed, the breathing is smooth and slow. If one is stressed breathing is fast or shallow. In this way, the mental and emotional state of a person has a positive or negative impact on health through breathing [3].

The functioning of all the organs like heart, brain, digestive organs, endocrine glands in the body have certain rhythms. Similarly the breathing also has a rhythm.

Pranayama is deep rhythmic breathing bringing the breath in desired rhythm by controlling the process of inhalation, retention and exhalation [3].

In the process of breathing, the diaphragm, intercostal muscles and accessory muscles of respiration are used. The diaphragmatic breathing is called vertical breathing and is considered to be more efficient way to inhale air than inhaling while expanding the chest which is considered to be the horizontal breathing which involves simply expanding the chest. In pranayama, one should utilize the diaphragm efficiently to get more oxygen without making much effort. The diaphragm is attached to the organs like heart and lungs on superior surface and to the liver, spleen, pancreas and stomach on inferior surface. Efficient movement of the diaphragm makes the functioning of these organs more efficient [3].

Many researchers and Yogis have reported the benefits of practising pranayama on Diabetes Mellitus [4], Heart Rate [5] and Nervous System [6]. Also research through Yoga Meditation has shown remarkable improvement in Patience, Physical Relaxation, Mental Stress relief [7] and physical relaxation [8] of the chosen subjects.

Nadi Shodhana Pranayama (Yogic breathing control) has beneficial effects on Autonomic Nervous System. It decreases sympathetic discharge, lowers metabolic rate and increases parasympathetic discharge. This study also proves long term beneficial effects to body on stressors if yogic breathing exercises are practiced regularly. [9]

This systematic breathing pattern results in improvement in Feeling Healthy, enhancing Memory Recall, decreasing Mental Stress and imparting Physical Relaxation.

## Methodology

Pranayama techniques are best practised while sitting on the floor on a blanket or a carpet or a mat. This form of practice is applicable to padmasana also. Padmasana is a posture in which the subject sits in a cross legged position as shown in the figure P1. However, any other posture is also acceptable provided the back is kept erect from the base of the spine to the neck and perpendicular to the floor. Bad and poorly performed posture leads to shallow breathing and low endurance. One must empty the bladder and bowels before starting pranayama. The best time for practice is the early morning, preferably before sunrise when the pollution is at its lowest level, and the body and brain are relatively relaxed. However, if morning is unsuitable, pranayama may be practiced after sunset, when the air is cool and pleasant. The place suitable for all kinds of Yoga must be clean and

calm. The practice of pranayama should be preferably carried out 3 hours after taking solid food and 1 hour after taking liquid food.

We chose our subjects in the age group 16-19 years, who practiced Pranayama, in Padmasana posture at evening time (6 p.m. to 7 p.m.) after attending their course classes. This age group was specifically selected for the reason that the newly found energy in this age is often not utilized judiciously. Practicing the pranayama helps in channelising this enormous energy [10].

The subjects practiced Pranayama for three months regularly.

There are various techniques of Pranayama but we applied the technique of Nadi Shodhan Pranayama on the subjects. This Pranayama is one of the simplest exercises which require no pre-requisite and the technique followed by the subjects is given in the subsequent section.

In NSP, the subjects are made to sit down in a comfortable place assuming a cross legged position on a mat. They are instructed to sit erect, remain calm and close their eyes. The breathing process starts by closing the right nostril with the right thumb, followed by inhaling slowly through the left nostril. After complete inhalation, the left nostril is to be pressed with the ring finger of the right hand and close the left nostril. Then the right nostril is opened to exhale slowly. After complete exhalation, the breath is inhaled through the right nostril. It is followed by closing the right nostril by pressing it with the right thumb. Finally the left nostril is opened to breathe out slowly. This explicitly described process is called one round of Nadi Shodhan Pranayama or Anuloma Viloma Pranayama (Alternate Nostril Breathing) and is depicted in figure P2. This is to be continued for 10 -15 rounds [11], [12], [13] and [14].

## Analysis

We chose a group of twenty subjects who practised Pranayama techniques for three months. The different characteristics such as Feeling Healthy, Memory Recall, Mental Stress Relief and Physical Relaxation were observed on the basis of the self introspection i.e. subjective observation by the person practicing these techniques. These were recorded using a well established Likert's five-point psychometric scale [15]. In this scale the subject is asked to self introspect his status of his trait in term of percentage. This percentage is taken as 10%, 30%, 50%, 70% and 90%. For example, if the person is feeling too weak physically and thinks he is terribly sick, he may choose 10% as his status of health. If the subject feels that he is somewhat

sick he may choose 30% on this Likert's scale. Conversely, if he feels that he is in perfect state of health, he may tick at 90%, while for more than average health, he may choose 70%. For average health condition, he may choose 50%. Similarly the choice is made for all other traits. It is a standard practice with Likert's five-point psychometric scale to simplify the analysis by clubbing the 10% and 30% categories and considering it as 20% and assumed as Low scale, 50% is retained unchanged and assumed at Medium Scale while and the values of 70% and 90% are clubbed and considered as 80%, assumed as High Scale.

The results are shown in Table 1.

The variation of these characteristics (before and after practicing Nadi Shodhan Pranayama techniques) has been shown in the figures (1 - 4). These effects are mentioned as follows.

## Results & Discussion

- A NSP technique was applied on a set of 20 engineering students. None of the students reported any decline in the status of health after this Pranayama. 15 out of these 20 students reported better in Feeling Healthy after this exercise. It can therefore be concluded 75% students (15 out of 20) improved in the Feeling Healthy level after Pranayama. Figure {1(a) - 1(b)}
- Similarly 80% of the students (16 out of 20) experienced better state of Memory Recall after Pranayama. None of the students reported any decline. Figure {2(a) - 2(b)}

- Mental Stress level of 75% students (15 out of 20) decreased after Pranayama. None of the students reported any decline. Figure {3(a) - 3(b)}
- State of Physical Relaxation of 90% students (18 out of 20) improved after Pranayama. None of the students reported any decline. Figure {4(a) - 4(b)}

After Pranayama, the low scale values of the Memory Recall and Physical Relaxation characteristics have been reduced to nil, whereas high scale values of Feeling Healthy, Memory Recall and Physical Relaxation have been drastically increased (Table 2, 3 and 5). The results for the Mental Stress characteristics are highly encouraging. Table 4 indicates drastic shift of Mental Stress from high scale to low scale after practice of Nadi Shodhan Pranayama.

The results obtained above are for the prescribed optimal technique of alternate nostril breathing. A common query that was posed by many participants to the authors was, what if it is not practically possible to attain these conditions?

It is hereby assured that the practitioners shall get some stress relief, even if he is not sitting in cross-legged position, or has skipped the gap time i.e. has eaten some solid or liquid food to quench his hunger and thirst. The result will be positive though not to the extent documented above, even if this technique is applied for shorter duration of time while traveling or sitting in office chair.

Table 1. Characteristics analysis before and after practicing Nadi Shodhan Pranayama (NSP)

S No.	Student Codes	Likert's scale of Feeling Healthy		Likert's scale of Memory Recall		Likert's scale of Mental Stress		Likert's scale of Physical Relaxation	
		Before	After	Before	After	Before	After	Before	After
1.	S1	50	70	50	70	50	10	70	90
2.	S2	50	70	50	70	70	50	30	70
3.	S3	30	90	50	50	70	30	50	70
4.	S4	50	90	50	70	70	70	50	70
5.	S5	70	90	50	70	70	70	50	70
6.	S6	50	90	50	70	70	70	30	90
7.	S7	70	90	70	90	50	10	50	90
8.	S8	70	70	30	50	50	50	50	70
9.	S9	30	70	30	70	70	30	70	90
10.	S10	50	90	50	50	70	50	50	50
11.	S11	70	90	50	70	70	70	50	50
12.	S12	50	50	50	50	70	30	30	50

S No.	Student Codes	Likert's scale of Feeling Healthy		Likert's scale of Memory Recall		Likert's scale of Mental Stress		Likert's scale of Physical Relaxation	
		Before	After	Before	After	Before	After	Before	After
13.	S13	30	50	50	70	50	30	30	50
14.	S14	30	30	50	70	70	70	70	90
15.	S15	50	50	30	50	30	10	30	50
16.	S16	30	50	50	70	50	30	30	50
17.	S17	30	70	50	70	50	30	30	50
18.	S18	30	70	30	70	90	50	30	50
19.	S19	50	50	50	50	70	30	30	70
20.	S20	50	70	30	70	50	30	30	90

### Feeling Healthy; Memory Recall; Mental Stress Relief; Physical Relaxation.

Table 2

Scale of Feeling Healthy	Before Pranayama	After Pranayama
Low scale	35% (7 out of 20)	05% (1 out of 20)
Medium scale	45% (9 out of 20)	25% (5 out of 20)
High scale	20% (4 out of 20)	70% (14 out of 20)

Table 3

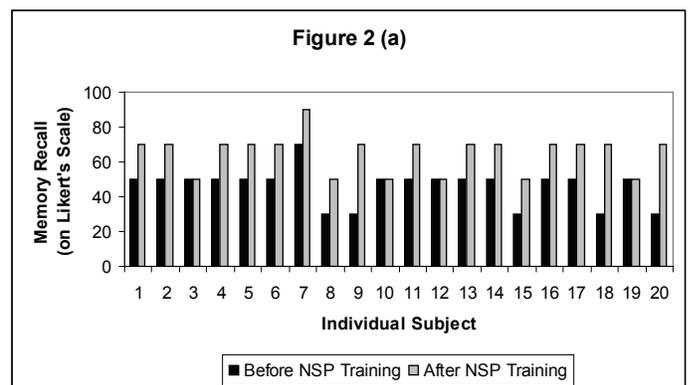
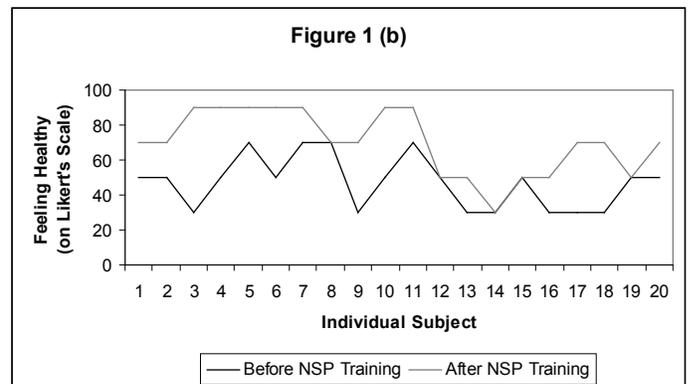
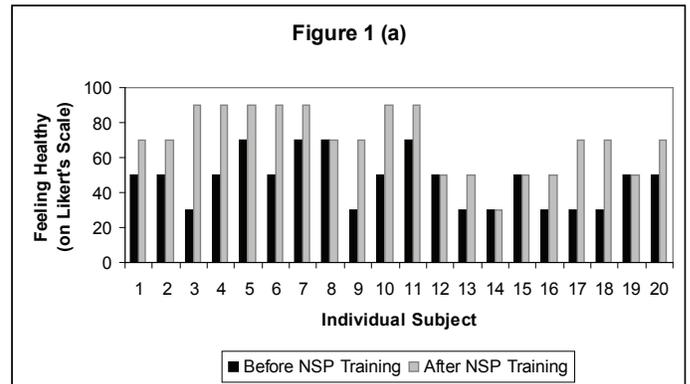
Scale of Memory Recall	Before Pranayama	After Pranayama
Low scale	25% (5 out of 20)	Nil
Medium scale	70% (14 out of 20)	30% (6 out of 20)
High scale	05% (1 out of 20)	70% (14 out of 20)

Table 4

Scale of Mental Stress	Before Pranayama	After Pranayama
Low scale	05% (1 out of 20)	55% (11 out of 20)
Medium scale	35% (7 out of 20)	20% (4 out of 20)
High scale	60% (12 out of 20)	25% (5 out of 20)

Table 5

Scale of Physical Relaxation	Before Pranayama	After Pranayama
Low scale	50% (10 out of 20)	Nil
Medium scale	35% (7 out of 20)	40% (8 out of 20)
High scale	15% (3 out of 20)	60% (12 out of 20)



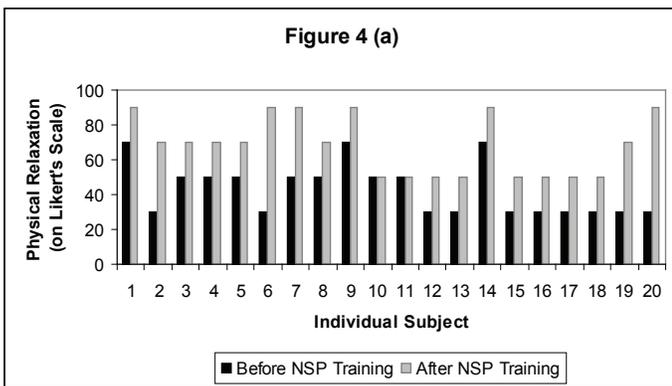
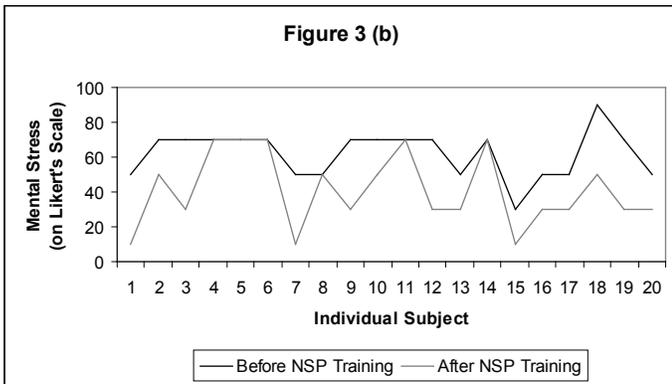
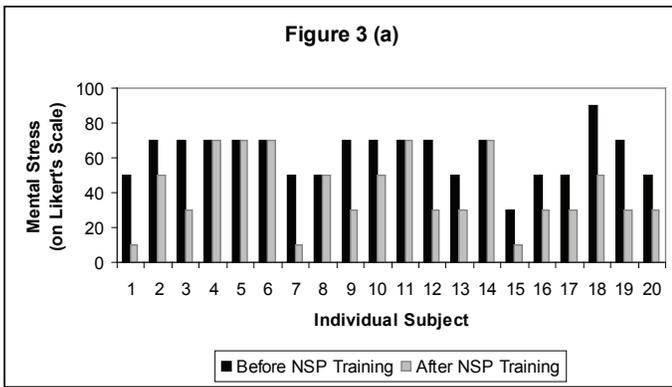
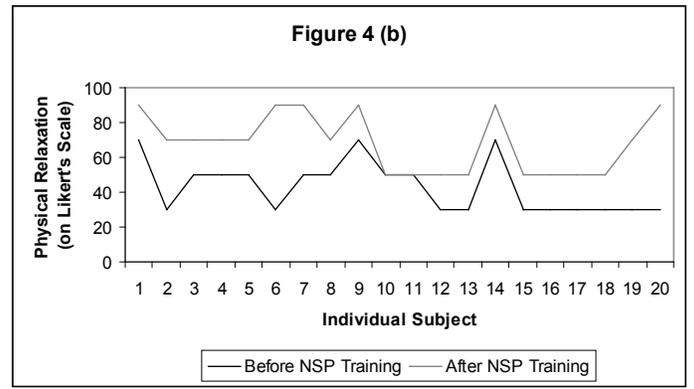
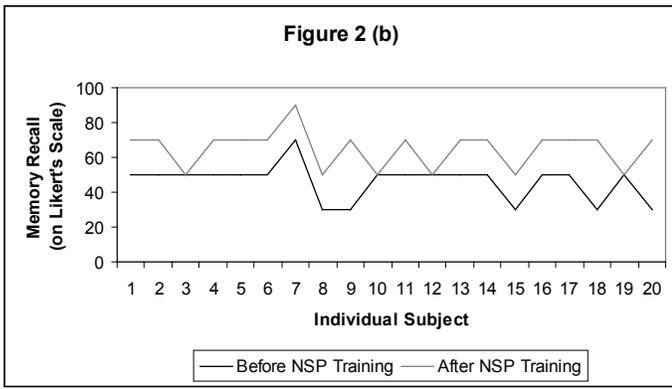


Figure P1

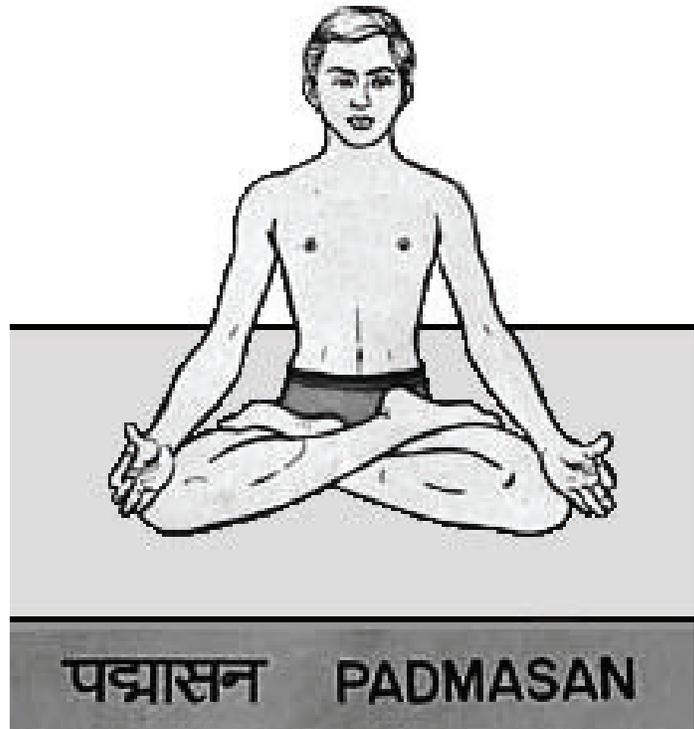
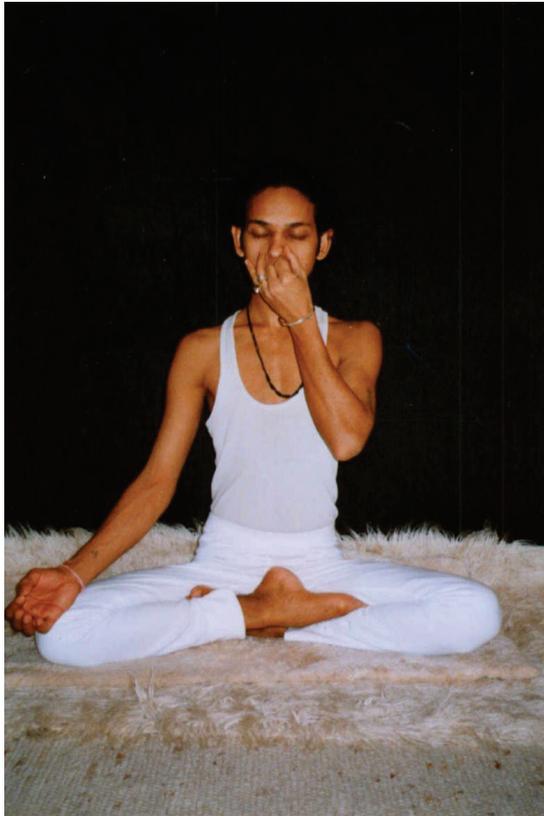


Figure P2



NADI SHODHAN PRANAYAMA POSTURE

The observed results are analyzed using t-test for knowing the statistical significance and presented in tables 6-9. The t-test is used to identify the significant difference in the means of two samples, namely before and after practising nadi shodhan pranayama.

Table 6

t-Test		
Feeling Healthy	Before Meditation	After Meditation
Mean	47	70
Variance	222.1052632	336.8421053
Observations	20	20
Pearson Correlation	0.461811804	
Hypothesized Mean Difference	0	
df	19	
t Stat	-5.877033172	
P(T<=t) two-tail	1.16684E-05	
t Critical two-tail	2.09302405	

Table 7

t-Test		
Memory Recall	Before Meditation	After Meditation
Mean	46	65
Variance	109.4736842	121.0526316
Observations	20	20
Pearson Correlation	0.365758478	
Hypothesized Mean Difference	0	
df	19	
t Stat	-7.024622676	
P(T<=t) two-tail	1.09232E-06	
t Critical two-tail	2.09302405	

Table 8

t-Test		
Mental Stress	Before Meditation	After Meditation
Mean	62	41
Variance	185.2631579	441.0526316
Observations	20	20
Pearson Correlation	0.618651309	
Hypothesized Mean Difference	0	
df	19	
t Stat	5.687824835	
P(T<=t) two-tail	1.75242E-05	
t Critical two-tail	2.09302405	

Table 9

t-Test		
Mental Stress	Before Meditation	After Meditation
Mean	62	41
Variance	185.2631579	441.0526316
Observations	20	20
Pearson Correlation	0.618651309	
Hypothesized Mean Difference	0	
df	19	
t Stat	5.687824835	
P(T<=t) two-tail	1.75242E-05	
t Critical two-tail	2.09302405	

t-test (dependent Sample)

t-test is used to identify the significant difference in the means of two dependent samples.

### ***Null Hypothesis (Ho :)***

There is no significant difference in the means of the parameters of Feeling Healthy, Memory.

Recall, Mental Stress and Physical Relaxation before and after practising nadi shodhan pranayama.

### ***Alternative Hypothesis (Ha :)***

There is a significant difference in the means of the parameters of Feeling Healthy, Memory.

Recall, Mental Stress and Physical Relaxation before and after practising nadi shodhan pranayama.

### **Results of t-test**

From the Table 6-9 the t-critical value for all the parameters is 2.093 and the standard value at 1% significance level (99% confidence level) is 1.96. For interpretation, if the t-calculated value is less than the standard value then Ho : is accepted. But in this case t-calculated value is more than the standard value at both the levels. So here Ho : is rejected and Ha : is accepted i.e. there is a significant difference in the means of the parameters of Feeling Healthy, Memory Recall, Mental Stress and Physical Relaxation among the students before and after practising nadi shodhan pranayama i.e. the technique of practising nadi shodhan pranayama is proved to be useful for the subjects. Also it is observed from the results of t test, mean value of Feeling Healthy is shifted from 47 to 70, Memory Recall is shifted from 46 to 65, Mental Stress is shifted from 62 to 41 and Physical Relaxation is shifted from 43 to 68 before and after the test. The average value in this case is 50 since is the lowest and 90 is the highest value, while recording the responses. It means the content of Mental Stress declines where as the level of Feeling fHealthy, Memory Recall and Physical Relaxation rises after practising nadi shodhan pranayama.

### **Conclusion**

Yoga is a proven technique for bringing desirable changes in behavioral traits leading to wellbeing. The present study affirmatively proves the effect of practice of Nadi Shodhan Pranayama (NSP) in enhancing Feeling Healthy, Memory Recall, Mental Stress Relief and Physical Relaxation. It was observed that 75% of the subjects gained in terms of Feeling Healthy, 80% in terms of Memory Recall, 75% in terms of Mental Stress Relief and 90% in terms of Physical Relaxation. NSP improves the traits of Feeling Healthy,

Memory Recall and Physical Relaxation characteristics. It reduces Mental Stress level, which is highly contributing factor to disturb wellbeing of anyone. Also the higher stress level leads to many diseases. The regulation and control of above traits is highly significant to enhance the wellbeing of Engineering students. The authors want to spread the message through this research paper that to maintain good health, to get rid of diseases and lead a fulfilling life, which is the basic necessity at all levels of our society, NSP is a very effective technique. It may be safely concluded that NSP has immense potential of increasing the wellbeing of its practitioners irrespective of their age. It may become a universal tool for making this globe a happier place.

### **References**

- [1]“TCM and Acupuncture Health Info” available at <http://tcm.health-info.org/>
- [2]Dr. Padmasiri de Silva “The Psychology of Emotions in Buddhist Perspective” Sir D. B. Jayatilleke Commemoration Lecture Colombo, 1976 Buddhist Publication Society Kandy • Sri Lanka The Wheel Publication/237
- [3]Mandlik Gandhar “Pranayama - A Science of Breathing (I) “available at [www.yogapoint.com/pranayama/pranayama\\_science\\_1.htm](http://www.yogapoint.com/pranayama/pranayama_science_1.htm)
- [4]Upadhyay Avnish K, Balkrishna Acharya, Upadhyay Ruchita T. Effect of Pranayama [Voluntary Regulated Yoga Breathing] and Yogasana [Yoga Postures] in Diabetes Mellitus (DM) A Scientific Review. Journal of Complementary and Integrative Medicine, 2008; 5: 1:1:3. Available at:<http://www.bepress.com/jcim/vol5/iss1/3>
- [5]Raghuraj P, Ramakrishnan A G, Nagendra H R, Telles Shirley. Effect of Two Selected Yogic Breathing Techniques on Heart Rate Variability available at [http://www.healthandyoga.com/html/research\\_papers/ets/om.asp](http://www.healthandyoga.com/html/research_papers/ets/om.asp)
- [6]Jerath R, Edry J, Barnes V, Jerath V. Physiology of long pranayamic breathing: Neural respiratory elements may provide a mechanism that explains how slow deep breathing shifts the autonomic nervous system Medical Hypotheses, 2006; 67: 1:3:566-571.
- [7]Joshi Anurag, Singh Mandeep, Jindal Ritu, Parkash Jai. Role of Acoustic Meditation in Stress Management An Analysis. International Journal of Management Sciences, 2008; 4:2 (Dec. 2008) 56-67.

- [8]Joshi Anurag, Joshi Sunil, Singh Mandeep, Kaur Sukhwinder. STRESS A BANE – YOGA THE CURE in National Seminar on Ayurveda, 2009; 20-24.
- [9]Dr. Arun Kumar SR “Effect of Nadi Shodhana Pranayama on Autonomic functions among healthy young school children in the age group of 11-16 years” Dissertation of Master Degree in Physiology, Submitted To The Rajiv Gandhi University Of Health Sciences, Bangalore (Karnataka), India (2006).
- [10]“Secret of Eternal Youth” available at <http://www.ashram.org/doc/SecretOfEternalYouth.pdf>
- [11]Nadi Shodhan Pranayama <http://www.yogapoint.com/info/pranayama.htm>
- [12]“Nadi Shudhi” available at <http://www.healthandyoga.com/html/pran/nadishudhi.htm>
- [13]“Breathing Exercise (Pranayama) - Alternate Nostril (Anuloma Viloma)” {Demo Pictures of One Round of Anuloma Viloma (Alternate Nostril Breathing)} available at <http://www.abc-of-yoga.com/pranayama/basic/viloma.asp>
- [14]Video demonstration of “Alternate Nostril Breathing (Nadi Sodhana)” available at [http://www.metacafe.com/watch/735686/alternate\\_nostril\\_breathing\\_nadi\\_sodhana/](http://www.metacafe.com/watch/735686/alternate_nostril_breathing_nadi_sodhana/)
- [15]Walia J.S. “Chief Methods of Psychology”, Manual of Psychology, 1st ed. Paul Publishers, Jalandhar (Punjab) India, 2002.16-17.