

**Review Article****PRANAYAMA Breathing To Medical Students as a Modern Medical Education Technology**

Dr. T. Ganesan (MD)

Additional Professor, Department of Physiology, Sri Ramachandra University, Chennai, India

DOI: 10.5455/jrmds.2015312

**ABSTRACT**

With modern technologies we think and integrate, making the students not to use the unconscious brain to acquire the inherent knowledge of intuition, the basic quality of highly qualified professionals. The objective of this review is to introduce an intervention method at the time of early education itself to increase the empathy. First year education at medical college is a transit period from school to college. Some medical students find it very difficult to cope up with the increased workload. We should consider this and make them to lead a yoga way of life to live successfully and happily. Problems, solutions, tutorials, small group discussion, protocol, methodology, mentoring and student seminars developed by arts and management colleges should be modified to Medical College in such a way each medical student should become a potential Doctor. Modern Medical Education technologies which are useful to the city-based Medical Colleges may become a hazard or hindrance for the development of intuitive knowledge. Each one of us will be having different mode of learning and teaching. In order to reduce the burnout and stress-related mental disorders in medical students and physicians, one of the intervention methods is Yoga Breathing.

**Key words:** Pranayama, Medical Student, Stress, Education Technology.

**INTRODUCTION**

Medicine is the science and art of healing. A Physician should know Physics, Chemistry, Physiology, Philosophy, Mythology, Mathematics, Statistics, Psychology, Genetics and Clinical Medicine. According to Ayurveda disease occurs if there is an imbalance in wind, bile, and phlegm [1]. Homeostasis is the maintenance of constant internal environment [2]. The fundamental basis of traditional Indian medicine (Ayurveda), is integration—the balancing between the forces within and between man and nature. Today medicine is becoming too divided, compartmentalized, and commercialized, and thus far from its spiritual and pure purport, meaning, and contents [3].

Sushruta "Father of Plastic Surgery" was responsible for the advancement of medicine in ancient India [4]. Empathy decline during medical school may threaten health care quality. Empathy is essentially a desirable quality among clinicians and can be developed during medical education [5]. With modern technologies we think and integrate, making the students not to use the unconscious brain to acquire the inherent knowledge of intuition, the basic quality of highly qualified professionals.

The objective of this review is to introduce an intervention method at the time of early education itself to increase the empathy. First year education at medical college is a transit period from school to college. Some medical students find it very difficult to cope up with the increased workload. We should consider this and make them to lead a yoga way of life to live successfully and happily

**PHYSIOLOGY OF BREATHING**

Breathing is essential to life. Breathing is an automatic process that occurs without any conscious effort while we are awake, asleep or under anaesthesia. We can, however, exert some conscious control over our own ventilation by voluntarily changing the rate and depth of breathing. We can also voluntarily stop breathing for a short period of time until carbon dioxide builds up in the blood, which then will stimulate breathing regardless of how hard we try to hold our breath [6].

Breathing is a dynamic Behaviour. Breath holding, as a variety of the yogic technique Pranayama, is the easiest way to produce daily brief, intermittent hypoxia! [7]. Relative nostril efficiency (nasal cycle) is related to performance on cognitive tasks. Males

perform better on a spatial task during right-nostril breathing than they do during left-nostril breathing, and they perform better on a verbal task during left-nostril breathing than they do during right-nostril breathing. Females perform better on a spatial task during left-nostril breathing than they do during right-nostril breathing, but unilateral breathing does not influence their verbal performance [8]. Medical students need to have a good visuo-spatial memory in order to learn and reproduce the practical class experiments that is demonstrated to them [9].

### PRANAYAMA BREATHING

Pranayamas (in Sanskrit) are voluntarily regulated specific yoga breathing practices which includes breathing with awareness. Pranayama, defined as a manipulation of breathing, has been shown to contribute to a physiologic response characterized by the presence of decreased oxygen consumption, decreased heart rate, and decreased blood pressure, as well as increased theta wave amplitude in EEG recordings, increased parasympathetic activity accompanied by the experience of alertness and reinvigoration [10].

Kapalbhati (shining forehead, in Sanskrit): has the possible use in obesity by increasing the energy output. "Hatha Yoga Pradipika" says, 'by the proper practice of Pranayama, all the diseases are eradicated while through improper practice of Pranayama all diseases can occur [11]. The ancient yogic teachings were based on empirical observation and experience. Yoga is likely to have the most powerful and comprehensive effects when studied and practiced as a Complete System for health and spiritual growth in light of the interconnection of the body and the soul [12]. The psychology of Yoga reveals the way to awaken from the dream. Although Yoga is a Spiritual tradition within Hinduism, it is also considered a Science, an EDUCATIONAL process, and a contribution to Psycho-spiritual development in psychotherapy [13].

### LIFESTYLE EDUCATION: MODIFYING THE RATE, DEPTH, AND ROUTE OF BREATHING

Breathing is primarily involuntary. Changes in Breathing can be voluntary or altered by various environmental stimuli. Therefore, Breathing is categorized as either metabolic or behavioural. Breathing that change during various emotions is a subcategory of behavioural breathing due to the strong connection it has with emotion and behaviour.

The Amygdala is an important higher regulatory centre of the autonomic nervous system, involved in respiratory and cardiovascular control (LeDoux 1996, Saper 2002, Sah et al 2003). The limbic system, located in the medio-temporal lobe of the brain, is the centre that governs emotion. Change in basic respiratory rhythm is a pre-requisite for survival. Expression of emotions through vocalization and speech require integration of breathing with oral, pharyngeal and laryngeal motor function is an example of modulation of breathing [14].

While the primary role of respiration concerns metabolism and homeostasis, emotions such as disgust, anger, and happiness also influence respiratory activities (Boiten et al., 1994). While respiratory change that accompanies emotions can occur unconsciously, respiration can also be voluntarily altered associating with an activation of the motor cortex. There may be no physiological expression for the association between the three areas of the brain that regulate respiration: the brainstem, the limbic system, and the cerebral cortex. The brainstem works to maintain homeostasis, the limbic system is responsible for emotional processing, and the cerebral cortex controls intention [15].

Sleep is essential to our well-being and occupies about a third of our lives. The effect of yoga in old age include better subjective sleep quality, faster sleep latency, longer sleep duration, and less use of sleep medications. Yoga is relatively safe if common sense is applied [16].

### BENEFITS OF PRANAYAMA

- Teaches us the proper way to breathe
- Increases the capacity of our lungs
- Helps digestion
- Prevents diseases
- Develops attention
- Fights stress
- Relaxes body and mind
- Increases muco-ciliary clearance
- Self control

Learning Pranayama breathing technique is easy, doing it daily is tough. Can become a habit if done regularly like any other behaviour [17]

### MEDITATION & YOGA

The term Meditation includes many mental techniques. One is SILENT repetition of a word called

a “mantra”. Asian and other traditions describe Mantra Meditation as a method for changing mind states, as taught in Vedanta, Buddhism, and Chinese Medicine. One of the surprises with Mantra repetition is a significant drop in metabolic activity, reflected in “Breath suspensions” – spontaneous stopping of the breath without compensatory breathing afterward.

Consciousness is the water in which we swim. We can't jump out to see how it looks from the outside. In sleep, we see nothing. Ancient people knew about waking, sleep, and dreaming because they experienced those states in themselves, and they could see other people when they were sleeping and waking. Sleep, waking and dreaming are easy to identify based on our own experiences.

Waking is our time to open up to the world around us, perceive and explore, think about ourselves and one another, learn and prepare for the future, cope with challenges, express our emotions, and advance our personal and social goals. All of our purposeful survival and reproductive activities takes place during the conscious state. And waking state is the necessary condition for all MENTAL conditions.

### **CHATTERING IN THE WAKING BRAIN**

If we think of the brain as a huge football stadium with thousands of people just chattering with one another, the averaged sound is so irregular that it resembles white noise. However, every conversation in the stadium is very meaningful to the people doing the talking. We see local synchrony between two individuals in a conversation and global randomness because none of the conversations are linked to one another. It's convenient to call this the ‘chattering’ state of the foot ball stadium.

During the waking state, neurons in the different parts of the cortex and hippocampus are synchronized to one another and they are also highly correlated with each other at the single neuron level. That is analogous to spectators in the stadium talking in ‘sync’ with one another. But like the chattering people in the stadium, their conversations are independent of one another. If we record the overall sound in the stadium, we can see THE SYNCHRONIZED ACTIVITY.

Synchrony serves as an important coordinating rhythm for neurons that may be widely dispersed but that are supporting the same cognitive task, whether it is sensory perception, motor control, memory storage,

or the other active tasks. During deep sleep, this kind of synchrony breaks down.

### **CHEERING IN THE WAKING BRAIN**

When one team scores a thrilling goal, thousands of people suddenly applaud. This is an event-related cheer and is analogous to the event-related potential.

### **CHANTING IN THE UNCONSCIOUS BRAIN**

In deep sleep billions of neurons are highly coordinated and all their activity adds up during the UP state (the peak of EEG slow wave), and NOTHING seems to be happening during the DOWN swing of the slow wave. In fact, direct brain recordings show that during the DOWN swing of the global wave most neurons in the cortex are pausing, while during the UP phase billions of neurons are firing. The stadium analogy holds nicely for slow wave sleep, where billions of nerve cells are going “buzz-pause” over and over again, from 0.5 to 3.5 Hz.

### **CHATTERING AND CHANTING NEURONS**

Waking involves more differentiated information processing in much the same way that a stadium full of talking people serves to process more information than the same people all Chanting in unison. Because the Chanting brain stops working from 0.5 to 3.5 times per second, we cannot do any cognitive work during the DOWN swings of the slow waves. If the stadium analogy is right, most cognitive tasks happen during chattering states.

Almost all cognitive tasks take place during the waking state. What can we do completely unconsciously? We still do not know the answer, because it is difficult to do careful studies on sleep movement disorders, sleep walking, epileptic automatic behaviours and other zombie states (Crick & Koch 2003).

The body has billions of nerve cells, which join into massive tracts to make up the spinal cord and the brain. The brain is the most complex structure in the known Universe. It can be changed by drinking a cup of coffee or by listening to a favourite song. Some neuronal events happen over a thousandth of a second, while others take decades [18].

Burnout and stress-related mental disorders (depression, anxiety) occur in medical students and physicians with a significantly higher prevalence than

in the general population. At the same time, the learning of coping mechanisms against stress is still not an integral part of medical education [19]. Pranayama breathing is highly efficient in reducing stress.

## CONCLUSION

We should allow the medical students to taste the joy of Physiology. We have a strong history of medical science embedded in our genes. Professors above 50 years (who have not studied under Medical Education Unit) due to academic pressure, personal desire for fame, financial gain, and an inability to determine right from wrong who are trying to change, have studied in a relaxed manner in their college life. Problems, solutions, tutorials, small group discussion, protocol, methodology, mentoring and student seminars developed by arts and management colleges should be modified to Medical College in such a way each medical student should become a potential Doctor.

Modern Medical Education technologies which are useful to the city-based Medical Colleges may become a hazard or hindrance for the development of intuitive knowledge. Each one of us will be having different mode of learning and teaching. In order to reduce the burnout and stress-related mental disorders in medical students and physicians, one of the intervention methods is Yoga Breathing. There is a desperate need for educating researchers and future researchers (Medical students) about the burnout and stress-related mental disorders and the way to cope with the application of Yoga Breathing (Pranayama) as a way of life to live successfully and happily.

## REFERENCES

- Oumeish OY. The philosophical, cultural, and historical aspects of complementary, alternative, unconventional, and integrative medicine in the Old World. *Arch Dermatol* 1998;134:1373–86.
- John E. Hall PhD. Editor. *Guyton and Hall Textbook of Medical Physiology* 12<sup>th</sup> ed. Philadelphia: Saunders; 2012. P. 4
- Francis I. Achike. The temporal and challenging faces of integration in medical education: The fate of pharmacology. *Indian J Pharmacol* 2011;43(3):227–31.
- Champaneria MC<sup>1</sup>, Workman AD, Gupta SC. Sushruta: father of plastic surgery. *Ann Plast Surg* 2014;73(1):2-7.
- Lt Col R. Shashikumar et al. Cross sectional assessment of empathy among undergraduates from a medical college. *MEDICAL JOURNAL ARMED FORCES INDIA* 2014;70:179-85
- Rodney A. Rhoades, David R. Bell, editor. *Medical Physiology: Principles for clinical Medicine*. 4<sup>th</sup> ed. Philadelphia: Wolters Kluwer; 2012. P. 382
- Prakash Chintamani Malshe. *Nisshesha rechaka Pranayama* offers benefits through brief intermittent hypoxia. *Ayu* 2011;32(4):451–7.
- Block RA, Arnott DP, Quigley B, Lynch WC. Unilateral nostril breathing influences lateralized cognitive performance. *Montana State University, Bozeman* 59717; *Brain Cogn.* 1989 Mar; 9(2):181-90.
- Joanna Jyothsna, B G Subba Rao. To Study the Effect of Exclusive Unilateral Left Nostril Breathing on 'Visuo-Spatial Short Term Memory' in Undergraduate Medical Students. *International Journal of Health Sciences and Research* 2014; 4(8):152-9
- Jerath R, Edry JW, Barnes VA, 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. *Med Hypotheses* 2006;67(3):566-71.
- Shirley Telles, Nilkamal Singh. A review of the use of yoga in breathing disorders. In: Leon Chaitow, Chris Gilbert, Dinah Morrison, editor. *Recognizing and Treating Breathing Disorders- Multidisciplinary approach*; 2<sup>nd</sup> edition. China: Churchill Livingstone Elsevier; 2014. P. 279-81.
- David F Mayor. Vitalism. In: Marc S. Micozzi, editor. *Fundamentals of Complementary and Alternative Medicine*; 5<sup>th</sup> ed. Missouri: Elsevier; 2015. p. 69.
- Eleanor Criswell, Kartikeya C Patel. The yoga path: Awakening from the dream. In: Sharon G. Mijares, editor. *Modern Psychology and Ancient Wisdom: Psychological Healing Practices from the World's Religious Traditions*, 1<sup>st</sup> ed. Abington, Oxon: Routledge; 2014. p. 202-3.
- Ikuo Homma. Breathing and Noh: Emotional Breathing. In: Ikuo Homma, Hiroshi Onimaru, Yoshinosuke Fukuchi, editors. *New Frontiers in Respiratory Control: XIth Annual Oxford Conference on Modelling and Control of Breathing, Advances in experimental Medicine and Biology*, 1<sup>st</sup> ed. New York: Springer; 2010. p 337-54.
- Masaoka Y, Izumizaki M, Homma I. Where is the rhythm generator for emotional breathing? In: *Progress in Brain Research-The Central Nervous System Control of Respiration*, 1<sup>st</sup> ed. Oxford: Elsevier V.209; 2014. P. 367–77
- S. R. Pandi-Perumal, Jaime M. Monti, Andrew A. Monjan, Editor. *Principles and Practice of Geriatric*

- Sleep Medicine, 1<sup>st</sup> Ed. New York: Cambridge University Press, 2010. p. 410.
17. Shamita Misra, Jane McElroy. Take a Deep Breath: A pilot study demonstrating a significant reduction in blood pressure with 15 minute Daily Pranayama Breathing. *Annals of Behavioral Science and Medical Education* 2012;18(2):15-8.
  18. Bernard Baars, Nicole M. Gage, editor. *Fundamentals of Cognitive Neuroscience: A Beginner's Guide*, 1<sup>st</sup> ed. Oxford: Elsevier; 2013. p. 211-25.
  19. Katharina Wild, Michael Scholz, Axel Ropohl, Lars Brauer, Friedrich Paulsen, Pascal H. M. Burger. Strategies against Burnout and Anxiety in Medical Education – Implementation and Evaluation of a New Course on Relaxation Techniques (*Relacs*) for Medical Students. *PLoS ONE* 2014;9(12):1-12 e114967.

---

**Corresponding Author:**

Dr.T.Ganesan,  
Additional Professor,  
Department of Physiology,  
Sri Ramachandra University,  
Chennai-600116  
Email: [ttganesan@yahoo.co.in](mailto:ttganesan@yahoo.co.in)

Date of Submission: 20/01/2015

Date of Acceptance: 26/02/2015

---

**How to cite this article:** Ganesan T. PRANAYAMA Breathing To Medical Students as a Modern Medical Education Technology. *J Res Med Den Sci* 2015;3(1):7-11.

**Source of Support:** None

**Conflict of Interest:** None declared