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15. The Therapeutic Impact of Yoga and Meditation in Healthcare

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15.1 Introduction: Yoga and its Practices

In the last few years, yogic traditions and its practice has increasingly seeped into the day-to-day life of individuals, while its relevance is increasing globally. Yoga's acceptance as more than just body-based movements or a form of exercise, to become a prototypical model of holistic living has garnered much attention from researchers, practitioners and other related sciences worldwide.

Yoga is the science of holistic living that emerged from India approximately 2 millennia ago. The underlying philosophy of yoga is the liberation of the soul from the cycle of birth and rebirth, and achieving oneness or 'unity' with the 'atman' (ultimate self) (Chopra, 2004). Yogic practices or 'Ashtanga yoga' is an ancient discipline that brings holistic living into practice through achieving balance between physical, mental and spiritual dimensions of an individual. The various revered ancient Indian texts (Vedas) have multiple mentions of yoga describing it as a practice of the wise, to better one's mental health, and prosperity (Yajurveda). To be able to achieve liberation of the soul, it was imperative to have a healthy body for which Hatha yoga was developed that consists of asana, pranayam, mudra etc. Yoga was systematized into different steps by Patanjali in the 'Yoga Sutras'. He outlined eight steps in achieving the 'ultimate self', and these steps came to be known as 'Ashtanga yoga'. 'Asht' means 'eight', and 'ang' means limbs, in Sanskrit language. According to Patanjali's description, the 'limbs' are all interconnected, similar to a body. Therefore, ashtanga yoga is not successive steps to be achieved, but are a natural course of the process, where movement in one limb, makes the other follow.

The 'eight limbs' are represented as a 'tree' metaphorically, consisting of eight aspects; Yama, niyama, asana, pranayam, pratyahara, dharana, dynana, and samadhi (Sengupta, 2012).

- Yama refers to the required ethical restraints that enable harmonious existence with other beings. It further includes five principles of; Ahimsa (Non-violence), Satya (Truth), Asteya (non stealing), Brahamcharya (Celibacy), Aparigraha (Non possession).
- Niyama are the actions that are necessary to be followed to achieve harmony or balance with oneself. Like Yama, there are five Niyama; Sauca (cleanliness), Santosa (Contentment), Tapas (Perseverance), Svadhyaya (Self- study), Ishvara Pranidhana (Surrender to the divine).
- Asanas consist of various physical postures that are to be carried out with steadiness, comfort, and spirit. When practiced mindfully, it not only reaps physical benefits, but is

also supposed to purify one's mind through leaving a sense of lightness and expansion in the practitioner. It provides a release of emotional, mental and physical energy for a person (Iyengar, 1976 as cited in Sengupta, 2012).

- Pranayama involves the 'pran', the essential life force, that is rooted in the philosophy of Mind-Body monism and thus works to achieve harmony of the two through breath awareness and bring creativity, joy, and love. Clarity, and emotional and mental steadiness can be achieved through the practise of pranayama. Some of the important pranayamas are; Dirgha pranayama, Ujjayi, Kapalbhati, Brahmiri.
- Pratyahara involves restraining from anything that nourishes the senses or in simpler language 'non indulgence of the senses' to be able to look inwards to journey to self-realization and inner peace.
- Dharana is to hold an unwavering attention or focus towards one direction. This is usually attained as a natural consequence of practicing asana, pranayama, and pratyahara.
- Dynana involves just 'existing or being'. It takes a practitioner in a space where they experience deep rest and attainment of great energy and vitality. It required effortlessness to be able to maintain existence in this state, which is quite opposite to the process of gaining bodily vitality.

Patanjali described 'Samadhi' as, "losing consciousness of body, breath, mind, intelligence, and ego". Samadhi is the enlightenment that the practitioner archives and it enables them to illuminate anyone who comes to them in search of truth.

15.2 Benefits of Pranayama and Shloka Chanting:

Pranayama is the breath awareness that affects the body and mind bidirectionally (Gilbert, 1999). It involves breath modulation, viz, pacing, retention of breath etc. The scientific community has shown keen interest in the application of yoga, especially pranayama in achieving great health and wellbeing.

Simple breathing exercises have been clinically proven to reduce excessive arousal. Yogic nasal breathing promotes physical wellness, cognitive capacities, improves lung capacities, and decreases anxiety among other benefits through increased parasympathetic tone (Thanalakshmi et al., 2020).

Significant body of research has also found a strong connection between Pranayama and stress or stress induced disorders such as Hypertension. Studies have found that the HypoThalamo Pituitary Adrenal (HPA) Axis response to stress can be regulated through yoga, thus establishing its positive effect for stress management (Kirkwood et al., 2005). The regulation of Autonomic Nervous System (ANS) through brief yogic relaxation training was also observed in one of the studies, through such relaxation techniques.

Shlokas are another integral part of 'yog'. They are the sacred verses from Hindu scriptures that hold profound significance in spiritual practices. It is believed that chanting of shlokas induces a sense of tranquility and inner peace among practitioners. Shlokas are a part of different yogic techniques that are followed to achieve a meditative sense of being. The chanting is usually rhythmic and is accompanied by breath work that is a part of *pranayama*.

The studies by James Hartzell that led to the coining of the term, 'the sanskrit effect' has garnered great attention worldwide due to it detailing the neurophysiological and brain changes in people with years of training and memorisation of these verses.

Raorne and Shetty (2020) in their study reported positive correlation between sanskrit shloka chanting and mindfulness. Studies have also shown that chanting can reduce stress levels, lower blood pressure, and promote overall emotional well-being. The meditative aspect of shloka recitation induces a relaxation response in the body, triggering the release of endorphins and other neurotransmitters associated with feelings of contentment and happiness (Tripathi & Kumar, 2018). In addition to its immediate effects, regular practice of shloka recitation is believed to have long-term benefits in terms of reducing stress and consequently enabling regulation of the autonomic nervous system (Sharma, Sen & Singh, 2014) and Hypothalamo pituitary Adrenal (HPA) axis.

15.3 Effects of Pranayama:

Some of the most initial research on yogic breathing has aimed at investigating its effects on the human body, and especially neurocognitive capabilities. The special interest in neurocognitive abilities is due to the multiple linkages of yoga with mind made in ancient Indian text on yoga, such as in one, "As the breath moves, so does the mind, and mind ceases to move as the breath is stopped" (Muktibodhananda, 2002).

There are various ways through which yogic breathing impacts the brain activity such as changes in breathing pace, modulation of breathing, manipulation of nostrils etc. Researchers have suggested an increase in EEG activity (alpha activity) in different brain areas after a few minutes of intense (high frequency) yogic breathing called Kapalabhati (Stancák et al., 1991). In another study by Telles et al. (2013), it was reported that Bhastrika pranayama or bellow's breathing led to decrease in reaction time after 18 mins of practice. After 9 rounds of this practice Auditory (ART) and Visual reaction time (VRT) was also recorded to be reduced in healthy school children (Shavanani & Udupa, 2003). Brahmari pranayama (female honey bee humming) has been shown to alter brain response through resonance induced by the humming sound that is produced during its practise, causing non epileptic paroxysmal gamma waves in the EEG (Vialatte et al., 2009).

15.3.1 Psychophysiological Effects of Pranayam:

The yogic breathing and its effect on the autonomic functions (AFT) has been widely researched. Such assessments have taken into consideration functions such as; Blood pressure, Galvanic skin resistance (GSR), and Heart Rate Variability (HRV). With repeated practice of pranayam for only one week, the autonomic functions have been observed to take a parasympathetic shift (Turankar et al., 2013). Although the precise mechanism of action is unknown, yogic breathing exercises cause a shift in the dominance of the parasympathetic nervous system, presumably by direct vagal stimulation. After an 8-week yoga intervention, individuals with depression showed significantly reduced levels of low-frequency HRA, a marker of activation of the sympathetic nervous system. In a prospective controlled study by Sharma et al (2008), the short-term impact of comprehensive but brief lifestyle intervention based on yoga on subjective well-being with normal and individuals

with diseases such as coronary artery disease, hypertension, diabetes mellitus (DM) reported significant improvement in the subjective well-being scores of participants within a period of 10 days as compared to controls. Therefore, even a brief intervention can make an appreciable contribution to primary prevention as well as management of lifestyle diseases. Similarly, improvement in Quality of life and physical measures have also been associated with the practise of yoga and pranayam (Oken et al, 2006).

An increase in intrinsic neurohormonal activity has been associated with increased susceptibility to ischemic heart disease, and this could provide an explanation for the way that overall stress in life raises the risk of heart disease. Regular yoga practitioners show significant reduction in the markers associated with intrinsic neurohormonal activity; such as urinary excretion of catecholamines, and luteinizing hormone levels. The yoga based guided relaxation helps in reducing heart rate, skin conductance, oxygen consumption and other clinical markers of ischemic heart disease, consequently acting as a barrier against myocardial infarction (Vempati & Telles, 2000).

Stress and anxiety have been associated with other lifestyle and chronic diseases as well. Meditative exercises suggested as a part of yogic breathing exercises have shown to reduce exacerbated stress response and arousal, thus making it effective intervention for anxiety and depression both.

The major impact of yogic breathing is believed to be on the HPA axis that is responsible for triggering a stress response. The down regulating of the HPA axis in turn down regulates the possible physical, psychological and behavioral effects that are consequential to the release of catecholamines and cortisol (Sengupta, 2012).

The ‘flight or fight’ response that is triggered by the perceived stressor when experienced more often than required leads to excessive stimulation of the HPA axis, which in turn manifests as hypervigilance. As a result, the dysregulated nervous system becomes the cause of multiple diseases such as obesity, hypertension, diabetes, autoimmune disorders, substance use etc (Sterling, 2004).

In such cases, yoga acts to reduce the perceived stress and enable self-soothing through breathing, relaxation and exercises, thus regulating stress response and easing the physiological arousal associated with the triggers. High pain tolerance has also been associated with practice of yoga as compared to control groups in a study using functional MRIs (fMRIs) that showed lower pain related brain activity in yoga practitioners (Smith et al., 2007).

Pranayama has been found to help tackle oxidative stress (imbalance between oxidants and antioxidants present in the body). Yogic breathing helped to reduce the free radicals load among healthy volunteers as compared to control groups (Bhattacharya, Pandey & Verma, 2002).

There is also evidence that suggests a positive effect of pranayama on the respiratory system. However, there is still limited evidence on the exact mechanism that leads to such gains (Hakked, Balakrishnan & Krishnamurthy, 2017)

15.3.2 Yogic Breath Regulation, Health and Diseases:

The practice of yogic breathing in its traditional form has been experimented upon in different clinical setups to understand its immediate impact on diseased individuals, especially hypertensive individuals. Studies have shown profound reduction in the SBP, Pulse pressure, mean arterial rate and other hemodynamic variables after following Sukha Pranayama for 5 mins at 6 breaths per minute. After 27 rounds of left uninostril breathing (UNB), an immediate reduction in SBP, HR, and pulse pressure was recorded in hypertensive patients (Bhavnani et al., 2012). Antihypertensive medications when combined with yogic breathing yield better results in reducing blood pressure than medications alone (Goyal et al., 2014). Studies also suggest improvement and stability in symptoms in patients of asthma (Saxena & Saxena, 2009). A study also reported the usefulness of Bhramari pranayama practice for 45 minutes per day, 3 days per week for 8 weeks in bringing beneficial changes in pulmonary tuberculosis patients such as improved BMI, symptom scores, pulmonary function and health related Quality of life (Mooventhan & Khode, 2014).

In a study by Jyotsna et al. (2012), the group of diabetic patients following a comprehensive yogic breathing program reported improved QoL and a trend of glycemic control, as compared to the group following standard treatment procedure. In chronic diseases such as cancer, pranayama has proven to be beneficial in providing cancer related symptomatic relief, thus leading to improved QoL. Dhruv et al (2012) in their study reported improvement in quality of sleep, and reduced anxiety by practicing pranayama between two chemotherapy sessions.

15.4 Chanting and Its Medical Benefits; Stress, Hypertension and Immunity:

Chanting of mantras is essentially supposed to provide a feeling of bliss and help an individual achieve meditative state by repeating a mantra. Achieving such a state would reflect in the mantra repetition taking over the consciousness of the practicing individual, while the mind shifts to an empty state (without any thought, anxieties or attachments) (Ospina et al., 2017). Meditation has been proven to provide various health benefits, especially targeting psychological issues such as anxiety, depression, and insomnia (Tseng, 2022).

Studies suggest that standardized chanting sessions help in significantly reducing the symptoms of cognitive anxiety as compared to groups practicing progressive relaxation. Further, effects of transcendental meditation (TM) on brain functioning were studied by Travis et al. (2009). The results suggested that TM significantly reduces the effects of triggers related to previous stressful experiences, while also optimizing functioning of the person amidst stressful situations. Other studies indicate burnout reduction (Elder et al., 2014) lower sleepiness being negatively correlated with faster habituation (Travis et al. 2009), decrease in perceived anxiety and stress (Avvenuti et al, 2020), and increased Galvanic skin response (GSR) value leading to decreased arousal level (Das & Anand, 2012). Apart from stress and anxiety, research has shown correlations between decreased blood pressure (BP) and meditation through chanting in chronically hypertensive patients (Verma et al., 2021).

Furthermore, by contrasting the immune cells of the 19 participants in the TM group with the 16 participants in the control group, Infante et al. (2014) investigated the impact of TM on immunity. The TM group consistently exercised TM technique. An automated quantitative hematology analyzer tallied the total leukocytes, granulocytes, lymphocytes, and monocytes among the immune cells that were assessed. In comparison to the control group, the TM group exhibited greater values for B-lymphocytes, natural killer cells, and CD3+CD4-CD8+ lymphocytes.

15.5 The Biomedical Model of Diseases:

The biomedical model or simply medical model of illness is a fairly contemporary model that informs modern medicine and its practices. The model posits that 'absence of disease is equivalent to being healthy'. The cause of the disease is always attributed to external factors such as being the result of some virus, bacteria, or physiological abnormality, shifting the onus of the illness from the individual.

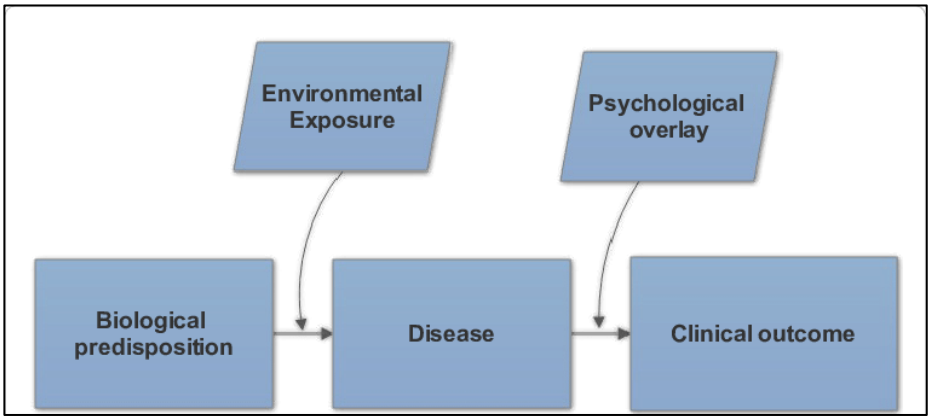

Figure 15.1: Source: Biomedical Model of Disease

According to this approach, diseases are caused by a person's inherent predisposition combined with exposures or environmental circumstances. Disease is defined as verified evidence of a pathology, as demonstrated by medical investigations. As a result, this approach does not acknowledge that a patient's impression of health is sickness. This concept fails to recognize that symptoms matter to patients even when they have no "medical" explanation. As a result, doctors may forsake such patients (Abdelnour & Nagi, 2017).

This reductionist approach does not take into account the emotional and psychological factors and their role in causing or maintaining illnesses, especially chronic diseases. The focus of the treatment remains on the physical or biological aspects where consequences of the illness involve removal of the pathogenic agents through either surgical interventions, or through drugs. The objective of the treatment is the removal of the agent and provide relief from the symptoms of the illness. Although the model fairs well in critical cases where immediate intervention is required, due to its reductionist nature, the approach is not the best for lifestyle, psychosomatic and other similar diseases (Gadgil, 2003).

This is where an integrated approach for advancing holistic lifestyle practices is required. The indigenous yogic practice stands as one of the leading approaches to treat chronic lifestyle illnesses, instead of just providing momentary symptomatic relief.

15.6 An Integrative Approach to Recovery: To Holistic Living

As found in ayurveda, 'nasato vidyate bhavo, na bhavo vidyate satam' presents the same views as 'omne vivum ex ovo' of modern science, that refers to the origin of life from pre-existing living things (Rastogi, 2010).

However, yogic practices such as the one described in this text have always been considered as part of alternative medicine. This status has only cloaked the merits of the practices in clinical setups. As mentioned earlier, allopathic medicine follows the biomedical approach to treatment and recovery.

Therefore, it has always been an 'either-or' fight between Allopathy and Ayurvedic medicine, when empirical evidence has repeatedly suggested that an integrative approach would be best suited for various categories of diseases, especially chronic diseases.

In lieu of the fact that medicine of any kind is not complete in itself, it is imperative that allopathic and ayurvedic medicine interact with each other to help an individual be healthy in their truest form. i.e. not just being free of disease, but being in a state of physical, mental and social well-being (WHO).

Therefore, the medical model in itself is insensitive to the social and psychological context of an individual in development and management of the disease. The model works on the spectrum that has illness (characterized majorly by the observable symptoms) on one side, and being disease free (characterized by the symptomatic management) on the other side.

A newer, focused approach needs to be developed to work with a preventive approach rather than post facto intervention-based approach.

The practice of meditation in the form of pranayama, chanting and mantra meditation, or TM needs to be actively integrated into the interventional practices that are advised to the patients, to target the psychological and psychosomatic factors involved in illness.

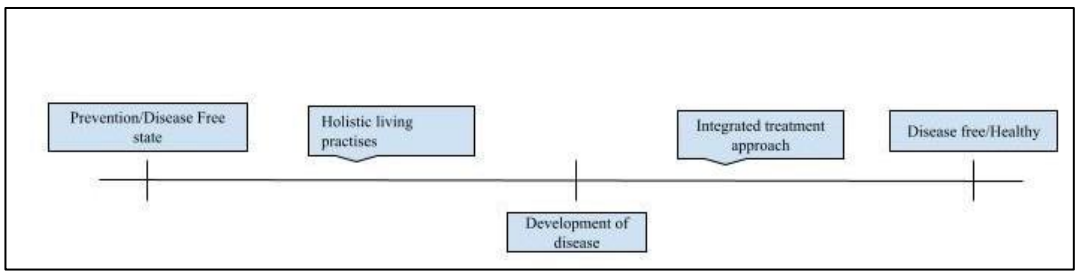

Figure 15.2: Yogic practices in Health-Illness Spectrum

As demonstrated in Figure 15.2, unlike the medical model, the intervention through yogic practices can start for the individual starting from the disease-free state on the spectrum, where lifestyle changes and other living practices can be developed based on the yogic philosophy of holistic living.

This would ensure reduced exposure to pathogens while also optimizing the immunity of the individual in case of any exposure. Furthermore, if the individual develops any kind of pathology that is chronic and needs immediate attention, the medical approach can be put to use. This would ensure immediate symptomatic relief. After any such intervention an individual is often left in a state where they are free of the symptoms but face various challenges in returning to previous levels of wellbeing. In line with the integrative approach, a focused ayurveda and yoga-based rehabilitation plan can be devised to ensure the individual's return to optimal health.

Table 15.1: Benefits of Integration in Various Intervention

In surgery	In perioperative care, ayurvedic practises can be used to reduce pain, and promote healing
In psychiatry	Stress management, reducing dependence on traditional medicines Evidence supports the benefits of yoga for Depressive disorders and Generalized Anxiety Disorder (GAD).
In oncology	Increased Quality of Life Post chemotherapy pain management Palliative care Immune system support

15.6 Conclusion:

Yoga and related practices in Ayurveda have garnered ample attention from scholars worldwide trying to solve the challenges created by the modern lifestyle and related health issues, especially mental health issues. This work deals with the effectiveness of yogic practices, especially in the area of chronic disease. Furthermore, the text highlights that Yoga significantly influences endocrine functioning, neurological equilibrium, emotional states, and crucial physiological components of the body. It is broadly accepted as an effective and affordable strategy that may

be used to eradicate illnesses and promote wellness. Highlighting the limitations of the biomedical model of illness that is followed in most medical training, the text brings in the perspective of looking at illness and health as different states on a spectrum.

This approach helps understand illness and health being affected by multiple factors including psychological, emotional, and social rather than being purely a consequence of biological predisposition. It is imperative that an integrative approach to health intervention be developed, where health behaviors rooted in yogic practices are promoted from the 'preventative/disease free state' on the spectrum, and be continued to develop optimal health.

15.7 References:

1. Abdelnour, Loay H & F, El. (2017). Functional Neurological Disorder Presenting as Stroke: A Narrative Review. Journal of Psychological Abnormalities. 06.
2. 10.4172/2471-9900.1000159.
3. Bhattacharya, S., Pandey, U. S., & Verma, N. S. (2002). Improvement in oxidative status with yogic breathing in young healthy males. Indian Journal of Physiology and Pharmacology, 46(3), 349–354
4. Bhavanani, A. B., & Sanjay, Z. (2012). Immediate effect of chandra Nadi pranayama (left unilateral forced nostril breathing) on cardiovascular parameters in hypertensive patients. International journal of yoga, 5(2), 108.
5. Bowker, J. (1997). World religions. New York: DK Publishing.
6. Chopra, D. & Simon, D. 2004. The seven spiritual laws of yoga. Hoboken, New Jersey: Wiley and Sons, Inc. Cooperrider, D.L. & Whitney, D.K. 2005. Appreciative inquiry: a positive revolution in change. CA San Francisco: Berrett-Koehler.
7. Das, I., & Anand, H. (2012). Effect of Prayer and "OM" Meditation in enhancing galvanic skin response. Psychological Thought, 5(2).
8. Dhruva, A., Miaskowski, C., Abrams, D., Acree, M., Cooper, B., Goodman, S., & Hecht, F. M. (2012). Yoga Breathing for Cancer Chemotherapy–Associated Symptoms and Quality of Life: Results of a Pilot Randomized Controlled Trial. The Journal of Alternative and Complementary Medicine, 18(5):473- 479
9. Gilbert C. (1999). Yoga and breathing. J Bodyw Mov Ther.;3:44–54.
10. Goyal, R., Lata, H., Walia, L., & Narula, M. K. (2014). Effect of pranayama on rate pressure product in mild hypertensives. International Journal of Applied and Basic Medical Research, 4(2), 67
11. Hakked, S, C., Balakrishnan, R., Krishnamurthy, N, M. (2017). Yogic breathing practices improve lung functions of competitive young swimmers. Journal of Ayurveda and Integrative Medicine, Volume 8, Issue 2, ISSN 0975-9476. https://doi.org/10.1016/j.jaim.2016.12.005.
12. Hartzell, J. F., Davis, B., Melcher, D., Miceli, G., Jovicich, J., Nath, T., Singh, N. C., & Hasson,
13. U. (2016). Brains of verbal memory specialists show anatomical differences in language, memory and visual systems. NeuroImage, 131, 181–192. https://doi.org/10.1016/j.neuroimage.2015.07.027
14. Infante, J. R., Peran, F., Rayo, J. I., Serrano, J., Domínguez, M. L., Garcia, L., Duran, C., & Roldan, A. (2014). Levels of immune cells in transcendental meditation practitioners. International journal of yoga, 7(2), 147–151. https://doi.org/10.4103/0973-6131.133899
15. Iyengar, B. K. S. (1966). Light on Yoga-Yoga Dipika.
16. https://mujmanipal-my.sharepoint.com/:f:/g/personal/library_muj_manipal_edu/EiAtLTx2m9NFopmw3I1tsV4BRQP2aWSj-BF5WXhg5nH2sg?e=jdOmaM
17. Jyotsna, V. P., Joshi, A., Ambekar, S., Kumar, N., Dhawan, A., & Sreenivas, V. (2012). Comprehensive yogic breathing program improves quality of life in patients with diabetes. Indian journal of endocrinology and metabolism, 16(3), 423.
18. Kirkwood, G., Rampes, H., Tuffrey, V., Richardson, J., & Pilkington, K. (2005). Yoga for anxiety: a systematic review of the research evidence. British journal of sports medicine, 39(12), 884-891

19. Kirkwood, G., Rampes, H., Tuffrey, V., Richardson, J., & Pilkington, K. (2005). Yoga for anxiety: a systematic review of the research evidence. British journal of sports medicine, 39(12), 884-891.
20. Mooventhan, A., & Khode, V. (2014). Effect of Bhramari pranayama and OM chanting on pulmonary function in healthy individuals: A prospective randomized control trial. International Journal of Yoga, 7(2), 104–110.
21. Muktibodhananda, S. (2002). Hatha Yoga Pradipika: Light on Hatha Yoga (2nd ed.). Bihar: Yoga Publication Trust.
22. Nandha R, Singh H. Amalgamation of ayurveda with allopathy: A synergistic approach for healthy society. Int J Green Pharm 2013; 7:173-6
23. Nemati, A. (2013). The effect of pranayama on test anxiety and test performance. International journal of yoga, 6(1), 55.
24. Oken, B. S., Zajdel, D., Kishiyama, S., Flegal, K., Dehen, C., Haas, M., ... & Leyva, J. (2006). Randomized, controlled, six-month trial of yoga in healthy seniors: effects on cognition and quality of life. Alternative therapies in health and medicine, 12(1), 40.
25. Ospina, M. B., Bond, K., Karkhaneh, M., Tjosvold, L., Vandermeer, B., Liang, Y., Bialy, L., Hooton, N., Buscemi, N., Dryden, D. M., & Klassen, T. P. (2007). Meditation practices for health: state of the research. Evidence report/technology assessment, (155), 1–263.
26. Raorane, P. R., & Shetty, V. (2020). Sanskrit Shloka chanting and mindfulness. Indian Journal of Mental Health, 7(4).
27. Rastogi., S. (2010). Building bridges between ayurveda and modern science.
28. IntJAyurvedaRes; 1:41-6
29. Sengupta P. (2012). Health Impacts of Yoga and Pranayama: A State-of-the-Art Review.
30. International journal of preventive medicine, 3(7), 444–458.
31. Shahab, L., Sarkar, B. K., & West, R. (2013). The acute effects of yogic breathing exercises on craving and withdrawal symptoms in abstaining smokers. Psychopharmacology, 225, 875-882.
32. Sharma, H., Sen, S., & Singh, A. (2014). Impact of shlok recitation on heart rate variability.
33. Journal of Ayurveda and Integrative Medicine, 5(2), 98–102.
34. Sharma, R. A. T. N. A., Gupta, N., & Bijlani, R. L. (2008). Effect of yoga-based lifestyle intervention on subjective well-being. Indian J Physiol Pharmacol, 52(2), 123-31.
35. Shavanani, A. B., & Udupa, K. (2003). Acute effect of Mukh bhastrika (a yogic bellows type breathing) on reaction time. Indian journal of physiology and pharmacology, 47,
36. 297-300.
37. Smith, C., Hancock, H., Blake-Mortimer, J., & Eckert, K. (2007). A randomised comparative trial of yoga and relaxation to reduce stress and anxiety. Complementary therapies in medicine, 15(2), 77-83
38. Stancák, A., Kuna, M., Srinivasan, Dostálek, C., & Vishnudevananda, S. (1991).
39. Kapalabhati--yogic cleansing exercise. II. EEG topography analysis. Homeostasis in Health and Disease, 33(4), 182–189.
40. Sterling P. (2004). Principles of allostasis: Optimal design, predictive regulation, pathophysiology, and rational therapeutics. In: Schulkin J, editor. Allostasis,
41. Homeostasis, and the Costs of Physiological Adaptation. Cambridge: Cambridge University Press; pp. 17–64.

42. Telles, S., Yadav, A., Gupta, R. K., & Balkrishna, A. (2013). Reaction time following yoga bellows-type breathing and breath awareness. Perceptual and Motor Skills, 117(1), 89-98
43. Thanalakshmi J, Maheshkumar K, Kannan R, Sundareswaran L, Venugopal V, Poonguzhali S. (2020). Effect of Sheetali pranayama on cardiac autonomic function among patients with primary hypertension – A randomized controlled trial. Complement Ther Clin Pract.;39:101138
44. Travis, F., Haaga, D. A., Hagelin, J., Tanner, M., Nidich, S., Gaylord-King, C., Grosswald, S., Rainforth, M., & Schneider, R. H. (2009). Effects of Transcendental Meditation practice on brain functioning and stress reactivity in college students. International journal of psychophysiology: official journal of the International Organization of Psychophysiology, 71(2), 170–176. https://doi.org/10.1016/j.ijpsycho.2008.09.007
45. Tripathi, S. K., & Kumar, N. (2018). Effect of chanting on stress and quality of life of nursing students. Nursing and Midwifery Research Journal, 14(2), 63–69.
46. Tseng A. A. (2022). Scientific Evidence of Health Benefits by Practicing Mantra Meditation: Narrative Review. International journal of yoga, 15(2), 89–95. https://doi.org/10.4103/ijoy.ijoy_53_22
47. Turankar, A. V., Jain, S., Patel, S. B., Sinha, S. R., Joshi, A. D., Vallish, B. N., ... & Turankar, S. A (2013). Effects of slow breathing exercise on cardiovascular functions, pulmonary functions & galvanic skin resistance in healthy human volunteers-a pilot study. The Indian journal of medical research, 137(5), 916.
48. Vempati, R. P., & Telles, S. (2002). Yoga-based guided relaxation reduces sympathetic activity judged from baseline levels. Psychological reports, 90(2), 487-494.
49. Verma, N., Rastogi, S., Chia, Y. C., Siddique, S., Turana, Y., Cheng, H. M., Sogunuru, G. P., Tay,
50. J. C., Teo, B. W., Wang, T. D., Tsoi, K. K. F., & Kario, K. (2021). Non-pharmacological management of hypertension. Journal of clinical hypertension (Greenwich, Conn.), 23(7), 1275–1283. https://doi.org/10.1111/jch.14236
51. Vialatte, F. B., Bakardjian, H., Prasad, R., & Cichocki, A. (2009). EEG paroxysmal gamma waves during Bhramari Pranayama: a yoga breathing technique. Consciousness and cognition, 18(4), 977-988.