



Scientific research on SKY Breath Meditation - Physical and Mental health benefits

Sudarshan Kriya (SKY) and accompanying breathing practices, referred to collectively as SKY and taught through the International Association for Human Values (IAHV) in collaboration with its sister organization Art of Living Foundation worldwide, have been found to enhance brain, hormone, immune and cardiovascular system function. Published research shows that SKY significantly reduces stress, depression, anxiety and Post-Traumatic Stress Disorder (PTSD), and significantly increases well-being both mentally and physically. Research also demonstrates that the effects of SKY reach all the way down to the molecular level, to our DNA.

Approximately one hundred independent studies conducted on four continents and published in peer-reviewed journals have demonstrated a comprehensive range of benefits from SKY Breath Meditation practice. These are briefly summarized below.

Mental Well-being:

Restoration and Enhancement of Vibrant Mental Health:

- **Relieves anxiety [1-13], depression [2, 4, 7-25], PTSD symptoms [3, 11, 18, 19, 26, 27] and stress levels [4, 6, 13, 20, 21, 23, 28-33].**
 - significant reductions in anxiety are found in many populations, including a 73% response rate and 41% remission rate in individuals for whom medication and psychotherapy treatments had not provided remission [1].
 - Multiple studies demonstrate that depressed patients who learned SKY experienced a 68-73% remission rate within one month.
 - Significant reductions in PTSD symptoms were found in 4-6 weeks and were sustained at 6 months[18] and one year[3], with no follow-up after 1 month [3, 18].
- **Reduces impulsivity and addictive cravings/ behaviors [25, 34-36]**
- **Improved emotional regulation [1, 13, 20, 21, 37-40]**
- **Enhanced wellbeing in healthy & health compromised individuals:** increased levels of optimism, joviality (e.g. joy, happiness, energy), serenity, resilience, social connection, mindfulness, self-esteem, life satisfaction and quality of life [4, 5, 18, 21, 23, 25, 36, 39, 41-46]

Enhanced brain functioning: [16, 17, 29, 33, 47, 48]

- **Increased mental focus / heightened awareness [33, 47]**
- **Increased interhemispheric connectivity and symmetry [48]**
- **Faster recovery from stressful stimuli [29]**

Improved Quality of Sleep:[44, 49-52]

- **Restoration of time spend in deep restful stages (stages III and IV) of sleep.[49]**
- **Reduced sleep onset latency (length of time it takes to fall asleep).**

Physical Well-being:

Enhanced biochemical status:

- **Reduced biochemical markers of stress:** cortisol [2, 31, 53, 54], corticotrophin [2] blood lactate [55], ACTH [2], and plasma malondialdehyde (MDA) [2, 56-58]
 - For example, at post-test blood lactate levels in police cadets who did not learn SKY were 4 times higher than their classmates who were randomized to learn SKY, suggesting a increased resilience to stress in SKY practitioners.
 - Since stressful physiological responses negatively impact immune, cardiovascular and endocrine systems, as well as mental health, this has significant implications for wellness [19].
- **Increased levels of antioxidant enzymes** (glutathione, catalase, and superoxide dismutase) [6, 45, 55, 58, 59]
 - Antioxidants protect us from many diseases and rapid aging.

Improved immune function:

- **Improved immune cell counts in apparently healthy individuals [28, 35]**
 - Some documented within three weeks (neutrophils, lymphocytes, platelet count) [28]
- **Improved immune cell counts in health compromised individuals seen in 12 weeks (Natural Killer Cells) [35]**

Enhanced Cardiovascular and Respiratory Function:

- **Reduced heart rate**
 - in both healthy and health compromised individuals [6, 60-63]
- **Improved blood pressure**
 - In both healthy and health compromised individuals [6, 57, 60, 61]
- **Improved Heart Rate Variability [13, 40, 63]**
- **Improved cholesterol and triglyceride (lipid) profiles: [56] [6, 28]**
 - Sometimes seen as early as 3 weeks, with no change in diet [56]
- **Improved respiratory function: [3, 11, 61, 62, 64-66]**
 - respiration rate dropped by 5% in 1 week [3] and 15% in 12 weeks [64]

- increased lung (vital/forced vital) capacity [61, 62, 65]

In Summary, SKY uses specific cyclical, rhythmic patterns of breath to bring the mind and body into a relaxed, yet energized state. Its effects have been studied in open and randomized trials, both in healthy and health compromised populations.

Research suggests that SKY reduces depression, anxiety, PTSD and stress. It has also been shown to curb addictive behaviors and substance abuse. It significantly increases feelings of well-being, optimism and mental focus and improves emotion regulation. In addition, SKY is associated with enhanced cardio-respiratory function, antioxidant status and immune system function. The SKY practice has even been shown to impact gene expression at short and long term periods, suggesting that its effects span all levels of the physiology from the DNA within our cells to organ systems. Viewed together, the wide range of documented benefits suggest that SKY may be an efficient tool for robustly strengthening the mind-body complex.

References:

1. Katzman, M.A., et al., *A multicomponent yoga-based, breath intervention program as an adjunctive treatment in patients suffering from Generalized Anxiety Disorder with or without comorbidities*. International journal of yoga, 2012. **5**(1): p. 57.
2. Vedamurthachar, A., et al., *Antidepressant efficacy and hormonal effects of Sudarshana Kriya Yoga (SKY) in alcohol dependent individuals*. Journal of affective disorders, 2006. **94**(1): p. 249-253.
3. Seppälä, E.M., et al., *Breathing-Based Meditation Decreases Posttraumatic Stress Disorder Symptoms in US Military Veterans: A Randomized Controlled Longitudinal Study*. Journal of traumatic stress, 2014. **27**(4): p. 397-405.
4. Kjellgren, A., et al., *Wellness through a comprehensive yogic breathing program - a controlled pilot trial*. BMC Complement Altern Med, 2007. **7**: p. 43.
5. Sureka, P., et al., *Effect of Sudarshan Kriya on male prisoners with non psychotic psychiatric disorders: A randomized control trial*. Asian journal of psychiatry, 2014. **12**: p. 43-49.
6. Agte, V.V. and S.A. Chiplonkar, *Sudarshan kriya yoga for Improving Antioxidant status and Reducing Anxiety in Adults*. Alternative & Complementary Therapies, 2008. **14**(2): p. 96-100.
7. Doria, S., et al., *Anti-anxiety efficacy of Sudarshan Kriya Yoga in general anxiety disorder: a multicomponent, yoga based, breath intervention program for patients suffering from generalized anxiety disorder with or without comorbidities*. Journal of affective disorders, 2015. **184**: p. 310-317.
8. Toschi-Dias, E., et al., *Sudarshan Kriya Yoga improves cardiac autonomic control in patients with anxiety-depression disorders*. Journal of Affective Disorders, 2017. **214**: p. 74-80.
9. Sharma, A., et al., *A breathing-based meditation intervention for patients with major depressive disorder following inadequate response to antidepressants: a randomized pilot study*. The Journal of clinical psychiatry, 2017. **78**(1): p. e59.
10. Hamilton-West, K., T. Pellatt-Higgins, and F. Sharief, *Evaluation of a Sudarshan Kriya Yoga (SKY) based breath intervention for patients with mild-to-moderate depression and anxiety disorders*. Primary health care research & development, 2019. **20**.
11. Vasudev, K., et al., *Sudarshan Kriya Yoga program in posttraumatic stress disorder: A feasibility study*. International Journal of Yoga, 2020. **13**(3): p. 239.
12. Shiju, R., et al., *Effect of Sudarshan Kriya Yoga on anxiety, depression, and quality of life in people with type 2 diabetes: A pilot study in Kuwait*. Diabetes & Metabolic Syndrome: clinical research & reviews, 2019. **13**(3): p. 1995-1999.

13. Kharya, C., et al., *Effect of controlled breathing exercises on the psychological status and the cardiac autonomic tone: Sudarshan Kriya and Prana-Yoga*. Indian J Physiol Pharmacol, 2014. **58**(3): p. 210-220.
14. Janakiramaiah, N., et al., *Antidepressant efficacy of Sudarshan Kriya Yoga (SKY) in melancholia: a randomized comparison with electroconvulsive therapy (ECT) and imipramine*. Journal of affective disorders, 2000. **57**(1): p. 255-259.
15. Janakiramaiah, N., et al., *Therapeutic efficacy of Sudarshan Kriya Yoga (SKY) in dysthymic disorder*. NIMHANS J., 1998. **17**: p. 21-28.
16. Naga Venkatesha Murthy, P., et al., *Normalization of P300 amplitude following treatment in dysthymia*. Biological Psychiatry, 1997. **42**(8): p. 740-743.
17. Murthy, P.N.V., et al., *P300 amplitude and antidepressant response to Sudarshan Kriya Yoga (SKY)*. Journal of affective disorders, 1998. **50**(1): p. 45-48.
18. Descilo, T., et al., *Effects of a yoga breath intervention alone and in combination with an exposure therapy for post-traumatic stress disorder and depression in survivors of the 2004 South-East Asia tsunami*. Acta Psychiatr Scand, 2010. **121**(4): p. 289-300.
19. Carter, J.J., et al., *Multi-component yoga breath program for Vietnam veteran post traumatic stress disorder: randomized controlled trial*. Journal of Traumatic Stress Disorders & Treatment, 2013. **2**(3).
20. Kharya, C., et al., *Effect of controlled breathing exercises on the psychological status and the cardiac autonomic tone: Sudarshan Kriya and Prana-Yoga*. Indian Journal of Physiology and Pharmacology, 2014. **58**(3): p. 210-220.
21. Goldstein, M.R., et al., *Improvements in well-being and vagal tone following a yogic breathing-based life skills workshop in young adults: Two open-trial pilot studies*. International journal of yoga, 2016. **9**(1): p. 20.
22. Carter, J., et al., *Multi-component yoga breath program for Vietnam veteran post traumatic stress disorder: randomized controlled trial*. J Trauma Stress Disor Treat 2, 2013. **3**: p. 2.
23. Seppälä, E.M., et al., *Promoting mental health and psychological thriving in university students: a randomized controlled trial of three well-being interventions*. Frontiers in psychiatry, 2020. **11**: p. 590.
24. Shetty, K.T., et al., *Therapeutic Efficacy of Sudarshan Kriya Yoga (SKK) in Dysthymic Disorder*. Nimhans Journal, 1998: p. 21-28.
25. Unudurthi, S.D., et al., *Sudarshan Kriya Meditation Reduces Substance Abuse Cravings and Improves Physical and Emotional Well-Being of Individuals With Opioid Use Disorder: A Pilot Study*. Journal of Psychosocial Nursing and Mental Health Services, 2023: p. 1-9.
26. Walker III, J. and D. Pacik, *Controlled Rhythmic Yogic Breathing as Complementary Treatment for Post-Traumatic Stress Disorder in Military Veterans: A Case Series*. Medical acupuncture, 2017. **29**(4): p. 232-238.
27. Bayley, P.J., et al., *Randomised clinical non-inferiority trial of breathing-based meditation and cognitive processing therapy for symptoms of post-traumatic stress disorder in military veterans*. BMJ open, 2022. **12**(8): p. e056609.
28. Subramanian, S., et al., *Role of sudarshan kriya and pranayam on lipid profile and blood cell parameters during exam stress: A randomized controlled trial*. International journal of yoga, 2012. **5**(1): p. 21.
29. Chandra, S., et al., *Mental stress: neurophysiology and its regulation by Sudarshan Kriya Yoga*. International journal of yoga, 2017. **10**(2): p. 67.
30. Goldstein, M.R., R.K. Lewin, and J.J. Allen, *Improvements in well-being and cardiac metrics of stress following a yogic breathing workshop: Randomized controlled trial with active comparison*. Journal of American College Health, 2020: p. 1-11.
31. Kumar, S., *Effect of "Sudarshan Kriya" on serum cortisol level before terminal examination in undergraduate medical students*. IJAR, 2017. **3**(7): p. 533-535.
32. Rankhambe, H.B. and S. Pande, *Effect of Sudarshan Kriya Yoga on cold pressor response in healthy young adults*. National Journal of Physiology, Pharmacy and Pharmacology, 2021. **11**(6): p. 589-592.

33. Daniel, R.V., G. Sharma, and S. Chandra, *Effective stress management through meditation: An electroencephalograph-based study*. International Journal of Yoga, 2022. **15**(1): p. 45.
34. Ghahremani, D.G., et al., *Effects of the Youth Empowerment Seminar on impulsive behavior in adolescents*. Journal of Adolescent Health, 2013. **53**(1): p. 139-141.
35. Kochupillai, V., et al., *Effect of rhythmic breathing (Sudarshan Kriya and Pranayam) on immune functions and tobacco addiction*. Annals of the New York Academy of Sciences, 2005. **1056**(1): p. 242-252.
36. Yadav, P., et al., *Impact of breathing and relaxation training (Sudarshan Kriya) on cases of alcohol dependence syndrome*. Industrial Psychiatry Journal, 2021. **30**(2): p. 341.
37. Gootjes, L., I.H. Franken, and J.W. Van Strien, *Cognitive Emotion Regulation in Yogic Meditative Practitioners*. Journal of Psychophysiology, 2011. **25**(2): p. 87-94.
38. Katzman, M.A., et al., *A multicomponent yoga-based, breath intervention program as an adjunctive treatment in patients suffering from generalized anxiety disorder with or without comorbidities*. Int J Yoga, 2012. **5**(1): p. 57-65.
39. Newman, R.I., O. Yim, and D.E. Shaenfield, *Gender and ethnicity: Are they associated with differential outcomes of a biopsychosocial social-emotional learning program?* International journal of yoga, 2020. **13**(1): p. 18-24.
40. Mathersul, D.C., et al., *Emotion dysregulation and heart rate variability improve in US veterans undergoing treatment for posttraumatic stress disorder: Secondary exploratory analyses from a randomised controlled trial*. BMC psychiatry, 2022. **22**(1): p. 1-12.
41. Jyotsna, V.P., et al., *Comprehensive yogic breathing program improves quality of life in patients with diabetes*. Indian journal of endocrinology and metabolism, 2012. **16**(3): p. 423.
42. Warner, A. and K. Hall, *Psychological and Spiritual Well-being of Women with Breast Cancer Participating in the Art of Living Program*, in *Psychology of Cancer*, N.L. Hicks and R.E. Warren, Editors. 2012, Nova Science Publishers, Inc.
43. Sloan, R.A. and D. Kanchibhotla, *The Association of Sudarshan Kriya Yoga with Happiness: A Case-Control Observational Study from Singapore*. Alternative Therapies in Health and Medicine, 2021.
44. Kanchibhotla, D., et al., *Impact of a yogic breathing technique on the well-being of healthcare professionals during the COVID-19 pandemic*. Global Advances in Health and Medicine, 2021. **10**.
45. Swain, D., P. Nanda, and H. Das, *Impact of yoga intervention on menopausal symptoms-specific quality of life and changes in hormonal level among menopausal women*. Journal of Obstetrics and Gynaecology research, 2021. **47**(10): p. 3669-3676.
46. Mawar, N., et al., *Sudarshan Kriya yoga improves quality of life in healthy people living with HIV (PLHIV): results from an open label randomized clinical trial*. The Indian Journal of Medical Research, 2015. **141**(1): p. 90.
47. Bhatia, M., et al., *Electrophysiologic evaluation of Sudarshan Kriya: an EEG, BAER, P300 study*. Indian journal of physiology and pharmacology, 2003. **47**(2): p. 157-163.
48. Bhaskar, L., et al., *High-frequency cerebral activation and interhemispheric synchronization following sudarshan kriya yoga as global brain rhythms: the state effects*. International Journal of Yoga, 2020. **13**(2): p. 130.
49. Sulekha, S., et al., *Evaluation of sleep architecture in practitioners of Sudarshan Kriya yoga and Vipassana meditation**. Sleep and Biological Rhythms, 2006. **4**(3): p. 207-214.
50. Sloan, R.A. and D. Kanchibhotla, *The association of Sudarshan Kriya Yoga frequency with sleep quality: a cross-sectional study from Singapore*. Sleep and Breathing, 2020. **25**(3): p. 1665-1669.
51. Kanchibhotla, D., et al., *The Influence of Sudarshan Kriya Yoga on Sleep Quality in Indian Adults: An Open Trial Pilot Study*. Sleep and Vigilance, 2021: p. 1-8.
52. Chaudhari, K.S., et al., *Effect of Sudarshan Kriya Yoga (SKY) on daytime and situational sleep propensity in novice practitioners: a prospective cohort study*. Journal of Complementary and Integrative Medicine, 2020.

53. Kumar, N., et al., *Randomized controlled trial in advance stage breast cancer patients for the effectiveness on stress marker and pain through Sudarshan Kriya and Pranayam*. Indian journal of palliative care, 2013. **19**(3): p. 180.
54. Mulla, Z.R. and Vedamuthachar, *Impact of a Sudarshan Kriya-based occupational stress management intervention on physiological and psychological outcomes*. Management and Labour Studies, 2014. **39**(4): p. 381-395.
55. Sharma, H., et al., *Sudarshan Kriya practitioners exhibit better antioxidant status and lower blood lactate levels*. Biological Psychology, 2003. **63**(3): p. 281-291.
56. Agte, V.V. and K. Tarwadi, *Sudarshan kriya yoga for treating type 2 diabetes: a preliminary study*. Alternative & Complementary Therapies, 2004. **10**(4): p. 220-222.
57. Agte, V.V., M.U. Jahagirdar, and K.V. Tarwadi, *The effects of Sudarshan Kriya Yoga on some physiological and biochemical parameters in mild hypertensive patients*. Indian J Physiol Pharmacol, 2011. **55**(2): p. 183-187.
58. Geetha, H., et al., *Quality of life after menopause: Effects of hormone replacement therapy, vitamin E and sudarhana kriya yoga practice: A comparative study*. Biomedical Research (0970-938X), 2014. **25**(2).
59. Sharma, H., et al., *Gene expression profiling in practitioners of Sudarshan Kriya*. Journal of psychosomatic research, 2008. **64**(2): p. 213-218.
60. Somwanshi S. D., H.S.M., Adgaonkar B. D., Kolpe D. V., *Effect of Sudarshankriya Yoga on Cardiorespiratory Parameters*. International Journal of Recent Trends in Science And Technology, 2013. **8**(1).
61. Kale, J.S., R.R. Deshpande, and N.T. Katole, *The effect of Sudarshan Kriya Yoga (SKY) on cardiovascular and respiratory parameters*. Int J Med Sci Public Health, 2016. **5**(10): p. 2091-4.
62. Bodi, S.G., et al., *Improvement in lung function with a unique breathing technique: Sudarshan kriya yoga (SKY)*. Chest, 2008. **134**(4): p. 144P.
63. Bhaskar, L., et al., *Assessment of Cardiac Autonomic Tone Following Long Sudarshan Kriya Yoga in Art of Living Practitioners*. The Journal of Alternative and Complementary Medicine, 2017. **9**: p. 705-712.
64. Somwanshi, S., et al., *Effect of Sudarshankriya Yoga on Cardiorespiratory Parameters*. Int J Recent Trends in Science and Technology, 2013. **8**(1): p. 62-66.
65. Chavhan, D.B., *The Effect Of Sudarshan Kriya and Bhastrika Pranayama on Endurance Capacity in Kho-Kho Players* International Multidisciplinary Research Journal, 2103. **6**(1).
66. Sahasrabudhe, S., et al., *Effects of yogic breathing exercise on lung function among adolescent children in India*. 2019, Eur Respiratory Soc. p. PA4133.

For more information:

For more information on SKY research, please visit: <https://www.aolresearch.org>

We welcome scholarly research on SKY from interested parties. If you would like to explore conducting research on SKY, please contact us at: research@aoluniversity.org

If you would like more information on our SKY wellness programs and/or our programs for special needs populations, please contact us at:

For North & South America: research@artofliving.org

For Europe: research@aoluniversity.org

For Asia: research@ssiar.org