

## ART OF LIVING RESEARCH

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Large body of research is available on transcendental and other forms of meditation as well as yoga postures. Over the last decade or so , research has been carried out on breathing processes including pranayama (P) and sudarshan kriya (SK). Research related to art of living (AOL) programs , which primarily includes SK&P is summarized below.

Mind – body interventions are beneficial in stress related mental and physical disorders. Yogic breathing is a unique method for balancing the autonomic nervous system and influencing psychological and stress related disorders. Sudarshan kriya yoga (SKY) – a sequence of specific breathing techniques ( Ujjayi, Bhastrika, and SK ) can alleviate anxiety, depression, stress, post traumatic stress disorder (PTSD) symptoms, and stress related medical illnesses (1). Kjellgren et al (2) studied 103 swedish individuals; 55 in SK&Pranayama (P) group and 48 in the control group. Control group simply relaxed, while SK&P group practiced the breathing processes . at the end of 6 weeks , participants in SK&P group , but not the control group lowered their degree of anxiety, depression and stress and increased their degree of optimism ( ANOVA;  $p < 0.001$  ). The participants in the yoga group experienced the practice as a positive event that induced beneficial effects.

Antidepressant efficacy of SKY has been demonstrated at National Institute Of Mental Health And Neurological Sciences (NIMHANS) , Bangalore, through number of studies ( 3 – 7 ). Investigators suggested that SK&P had the potential to be used as first line therapy for the management of melancholia (3).Vedamurthachar et al ( 8) conducted an open trial on 102 apparently healthy adult volunteers , to evaluate the effect of SKY practice on health, personal growth initiative and quality of life. Practice of sudarshan kriya yoga (SKY) resulted in significant increase in physical health scores, psychological health and social relationships. There was also a reduction in triglycerides , fasting cholesterol, low density lipoproteins ( LDL) and very low density lipoproteins (VLDL) after the yoga workshop.

In another study , vedamurthachar et al (9) demonstrated fall in cortisol and increase in prolactin following 6 days of SK practice.

Fall in total cholesterol, LDL cholesterol and increase in high density lipoproteins (HDL) cholesterol along with improvement in pulmonary functions following the practice of SKY has been reported by Sayyed et al (10) also. Yoga breath based interventions have been reported to help relieve psychological distress following mass disasters. Descilo et

al ( 11) assigned 183 tsunami survivors who scored 50 or above on the post- traumatic check list – 17 (PCL – 17 ), into one of the 3 groups: yoga breath intervention, yoga breath intervention followed by 3 – 8 h of trauma reduction exposure technique or 6 weeks of wait list. By 6 weeks, mean PCL- 17 declined by 42.5 +/- 10.0 SD with yoga breath, 39.2 +/- 17.2 with yoga breath plus exposure and 4.6 +/- 13.2 in the control. Hurricane Katrina refugees similarly felt relieved through yoga breath practices (12).

Reduction in anxiety and stress along with improvement in antioxidant status has been reported by Agte and Chiplonkar ( 13 ). Better antioxidant status along with lower blood lactate levels among the practioners of SK&P were observed and reported by Dr Neeta Singh's group from All India Institute Of Medical Sciences (AIIMS; 14 ).Same group ( 15 ) studied the effect of SK&P at molecular level and concluded that SK practicing subjects show higher resistance to oxidative stress and perhaps have a higher level of protection from cancer and cardiovascular diseases.

Positive effects of yogic breathing and meditation through a program of AOL called as breath, water and sound (BWS) program were documented by Yadav, Dhawan and Chopra ( 16: unpublished data ) at AIIMS in opiate dependent patients. Experimental group as against control group demonstrated increased enthusiasm, happiness, more alive to work, better control over emotions and decreased need for agonists and hypnotic medications. Heroin dependent patients in this study had positive changes in quality of life and motivation with in 2 weeks of BWS program. Antidepressant efficacy and hormonal effects of SKY were documented by Vedamurthachar et al (17) in alcohol dependent 60 individuals ( 30 experimental and 30 control ).

Paradigm consulting group of Tulsa ( 18 ) carried out a pilot study on police in Washington DC and reported significant reduction in stress and depression and improvement in sleep and digestion.

Objective analysis of effect of SKY on the brain has been carried out using electroencephalographic (EEG) studies. Bhatia et al(19) from AIIMS compared resting EEG , BAER and P300 among regular practitioners of SK&P vs healthy controls. Significant increase in the beta activity in subjects regularly practicing SK&P compared to healthy controls indicated better attentive information processing , meaning that subjects practicing SK&P were more focused and alert compared to normal controls. There were no significant differences in BAER and P300 among the 2 groups. Baijal and Srinivasan ( 20 ) recorded EEG during Sahaj Samadhi meditation , following SK&P and performed spectral and coherent analysis. Increased frontal theta activity was accompanied by reduced activity ( deactivation ) in parietal – occipital areas highlighting reduction in processing associated with self, space and time. Subsequent study by the same investigators ( 21 ) revealed larger mismatch negativity ( MMN) amplitudes in meditators vs non meditators indicating that concentrative meditation enhances pre attentive perceptual processes enabling better change detection in auditory sensory memory.

Significant increase in natural killer (NK) cells by 24 weeks of SK&P practice was noted by Kochupillai et al at AIIMS (22). There was no effect on T cell subsets. As many as 21 % of tobacco addicts gave up this habit. Rawat et al had similar experience (23).

Agte and Tarwadi ( 24) studied the effect of SKY on 57 diabetics. There was mild decrease in fasting and post prandial blood glucose levels. Also there was reduction in triglycerides and cholesterol. However HbA1C showed no significant difference. A prospective randomized controlled intervention trial by Jyotsana et al (25) showed that there was significant improvement in the quality of life (QOL) among diabetics but a non-significant trend toward improvement in glycemic control in the group practicing the comprehensive yogic breathing program compared with the group that was following standard treatment alone.

Role of SK&P on lipid profile and blood cell parameters during exam stress using a randomized controlled trial was conducted by Subramanian et al (26). Blood samples of 43 engineering students were collected at four intervals namely baseline (BL), exam stress (ES), three and six weeks practice of SK and P during exam stress. Lipid profile and hematological parameters were measured at all four intervals. ES elevated total cholesterol (TC), triglycerides (TGL) and VLDL levels. Hematological parameters affected by ES included neutrophil, lymphocytes, platelet count, packed cell volume (PCV) and mean cell volume (MCV). Three and six weeks practice of SK and P reduced the elevated lipid profile, hematological parameters and improved lymphocyte levels.

An open label intervention study was undertaken by Agte , Jahagirdar and Tarwadi(27) on 26 mild hypertensives and 26 apparently healthy adults (30-60 y), for the effect of SKY practice for two months as complementary therapy. In the hypertensives, there was a significant decrease in diastolic blood pressure ( $P < 0.01$ ), serum urea ( $P < 0.01$ ) and plasma malondialdehyde adducts (MDA) as oxidative stress marker ( $P < 0.05$ ). Other parameters; viz.; plasma levels of cholesterol, triglycerides, and glucose, did not change significantly ( $P > 0.1$ ).

Mahagita (28) demonstrated possible roles of meditation and meditation-based techniques including SK&P on the decrease of oxidative stress which may assist to prevent and/ or alleviate deterioration of related diseases. He further suggests that more research is needed to elucidate the cellular and molecular mechanisms to understand these effects .

Martin et al (29) evaluated the efficacy and tolerability of 22 hours SKY course in generalized anxiety disorder (GAD) , who after eight weeks of an appropriate dose of traditional therapy had not yet achieved remission. On an outpatient (OPD) basis , SKY course proved to be effective in significantly reducing anxiety in patients who had failed to achieve remission despite previous standard treatments including taking stable doses of psychotropic medications at the time of the study.

Ram, Shankar and Subbakrishna (30) evaluated participants following 5 days of advanced AOL program and recorded new perspectives among the participants related to social , occupational and home aspects.

Mechanisms responsible for calm alertness seen among those practising SK&P on regular basis , may include parasympathetic drive, calming of stress response system, neuroendocrine release of hormones and / or thalamic generators (1).

Brown and Gerbarg (31) aptly conclude that although more clinical studies are needed to document the benefits of program that combine pranayama, asanas and meditation, there is sufficient evidence to consider SKY to be a beneficial, low risk, low cost adjunct to the treatment of stress , anxiety, PTSD, depression, stress related medical illnesses, substance abuse, and rehabilitation of criminal offenders. SKY has been used as a public health intervention to alleviate PTSD in survivors of mass disasters. Yoga techniques enhance well being , mood, attention, mental focus and stress tolerance.

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