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PERSPECTIVES

Sudarshan Kriya Yogic Breathing in the Treatment of Stress, Anxiety, and Depression: Part II—Clinical Applications and Guidelines

RICHARD P. BROWN, M.D.,¹ and PATRICIA L. GERBARG, M.D.²

ABSTRACT

Yogic breathing is a unique method for balancing the autonomic nervous system and influencing psychologic and stress-related disorders. Part I of this series presented a neurophysiologic theory of the effects of *Sudarshan Kriya* Yoga (SKY). Part II will review clinical studies, our own clinical observations, and guidelines for the safe and effective use of yoga breath techniques in a wide range of clinical conditions.

Although more clinical studies are needed to document the benefits of programs that combine *pranayama* (yogic breathing) *asanas* (yoga postures), and meditation, there is sufficient evidence to consider *Sudarshan Kriya* Yoga to be a beneficial, low-risk, low-cost adjunct to the treatment of stress, anxiety, post-traumatic stress disorder (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. Proper training by a skilled teacher and a 30-minute practice every day will maximize the benefits. Health care providers play a crucial role in encouraging patients to maintain their yoga practices.

INTRODUCTION

A neurophysiologic theory of the effects of *Sudarshan Kriya* Yoga (SKY) was presented in our previous paper.¹ The theory was based on elements common to yogic breath practices, respiratory physiology, polyvagal theory, and vagal nerve stimulation. Here, relevant clinical studies are presented, along with personal clinical observations, and guidelines are proposed for the safe and effective use of yogic breath techniques for a wide range of clinical conditions.

Detailed descriptions of the four main SKY breath techniques were presented in our previous paper¹ and are summarized below.

1. *Ujjayi* or “Victorious Breath” is sometimes called “Ocean Breath” because the sound created by the gentle con-

traction of the laryngeal muscles and partial closure of the glottis is reminiscent of the sound of the sea. This slow breath technique (2 to 4 breaths per minute) increases airway resistance during inspiration and expiration and controls airflow so that each phase of the breath cycle can be prolonged to an exact count. The subjective experience is physical and mental calmness with alertness.

2. During *Bhastrika* or “Bellows Breath” air is rapidly inhaled and forcefully exhaled at a rate of 30 breaths per minute. It engenders excitement followed by calmness.
3. “Om” is chanted three times with very prolonged expiration.
4. *Sudarshan Kriya* or “Proper Vision by Purifying Action” is an advanced form of cyclical breathing at varying rates—slow, medium, and fast.

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STUDIES AND CLINICAL OBSERVATIONS

In addition to *pranayama*, SKY courses include *asanas* (yoga postures), meditation, group processes, and basic yogic knowledge.

Although volumes of books and anecdotal reports have been written on the psychologic benefits of Iyengar, Hatha, and other Yoga practices,²⁻⁵ we focus on SKY studies and personal clinical observations over the past 6 years from more than 400 patients of the authors and more than 50 referrals.

Depression

Three studies have found SKY to be effective in the treatment of depression.⁶⁻⁸ To isolate the antidepressant effects of the SKY *pranayama* program from other components of the SKY course, subjects were taught SKY breathing without *asanas*, meditation, or yogic knowledge. A 3-month, open pilot study of 15 patients with dysthymia and 15 with major depression (International Classification of Diseases, 10th Revision [ICD-10]) showed significant reductions in both Hamilton Rating Scales for Depression (HRSD) and Beck Depression Inventory scores after 1 week of SKY training and 3 more weeks of daily practice.⁸

In another 3-month open trial 46 outpatients with Dysthymic Disorder (*Diagnostic and Statistical Manual of Mental Disorders*, 4th edition) were given 1 week of training with *Ujjayi*, *Bhastrika*, and cyclical breathing followed by instructions for once-a-day home practice. About 75% of the patients practiced regularly (≥ 3 days a week). Nine (9) dropped out. Among the completers, 68% had remission of dysthymic disorder ($n = 25$). Remission was defined as a Clinical Global Impression (CGI) score ≤ 2 at both 1- and 3-month assessments and absence of criterion symptoms that justified the diagnosis of dysthymic disorder at recruitment at both 1 and 3 months. The 12 subjects without remission (nonremitters) practiced SKY < 3 days a week. Mean total depression scores dropped on the HRSD by $t = 14.6$, $p < 0.01$ and on the CGI by $t = 9.9$ ($p < 0.01$) at 1 month and stayed at the same levels at 3 months with $t = 16.8$ and $t = 9.9$, respectively. Among remitters, nonremitters, and non-completers there were no differences in attitude toward yoga.^{6,8} Although poor compliance among nonremitters and lack of placebo control were limitations, the high response among completers was probably not a placebo effect because dysthymic patients have a chronic condition, are less likely to remit spontaneously, and manifest low placebo response rates (as low as 18%) in other clinical studies.^{9,10}

In a 4-week study, 45 persons with severe melancholic depression were randomly assigned to three treatment groups: bilateral electroconvulsive therapy (ECT) 3 times per week; imipramine (IMN) 150 mg at night; or SKY.⁶ The SKY group was instructed to practice once per day for 30 minutes, followed by 15 minutes of rest, 6 days per week; but their practice was only directly observed 4 days per

week. Mean HRSD scores dropped significantly in all three groups by the end of 4 weeks: ECT from 26.7 ± 5.0 to 2.5 ± 2.8 ; IMN from 22.7 ± 5.7 to 6.3 ± 7.9 ; and SKY from 25.1 ± 6.5 to 8.3 ± 8.6 . The difference between SKY and ECT was statistically significant, but between SKY and IMN it was not. Considering the severity of the patients' depressions, the 67% rate of remission (HRSD < 8.0) with SKY is impressive. Although SKY was less powerful than ECT, it appeared to be an effective alternative to ECT or medication even in severe depression.⁷ A psychiatrist not involved in treatment assignment did the assessments. The institutional review board would not allow a placebo group because the patients were too severely depressed. Although compliance with medication and ECT treatments were maintained, 6 days per week SKY practice was not. The mean number of SKY sessions was 20.3 ± 2.8 (approximately 5 per week). It is possible that better supervision and more consistent practice could have produced even better results.

In private practice, patients with mild to moderate depression respond rapidly to SKY courses, often feeling better by day 5 (P.L. Gerbarg and R.P. Brown, personal observations). Many are able to reduce or discontinue antidepressant medication with sustained remission if they maintain regular daily SKY practice. Participation in follow-up sessions at least once per month and more frequently, if possible, improves outcome. More severely depressed patients respond more slowly and tend to show gradual improvement over 3-9 months (analyses of medication response in severe depressions show a similar time course). Frequency of practice is such a major factor in the response of depressed patients that SKY is recommended 7 days per week and, in some severely depressed patients, twice per day. Attendance at weekly follow-up sessions is critical for good outcomes. Severely depressed, treatment-resistant patients do better if they repeat the SKY program several times.

Insomnia, anxiety, phobias, and post-traumatic stress disorder

Insomnia is one of the first symptoms to respond to daily SKY practice. Many patients find that an extra 5-10 minutes of *Ujjayi* breathing while lying in bed at night with the lights out will help induce sleep. With the eyes closed, the patient breathes slowly through the nose using a slight contraction of the laryngeal muscles and partial closure of the glottis to produce the *Ujjayi* or "ocean" sound. For sleep induction, no counting or breath holding is needed and the focus is on the incoming and outgoing breath. *Ujjayi* quiets the mind, reduces obsessive worry, and induces a state of physical and mental calmness conducive to sleep.

Studies on yoga programs that include *Ujjayi*, yoga postures, and meditation have shown benefits in medical patients with anxiety disorders,¹¹ medical students with examination anxiety,¹² and caregivers of demented patients.¹³ Patients with mild anxiety disorders often respond to SKY

with an overall reduction in anxiety. When stress triggers anxiety, a few minutes of *Ujjayi* will often restore a sense of control. SKY can be a helpful adjunct in the treatment of phobias, but improvement may not be seen for 6–12 months, depending on the severity of the phobia.

Anxious patients need preparation before taking SKY courses. Patients who tend to hyperventilate may become fearful during the rapid-cycle breathing of *Sudarshan Kriya* or *Bhastrika* because it may remind them of hyperventilation. This fear can trigger a panic attack. It helps to explain that yoga is a controlled form of breathing and that, in and of itself, it will not trigger panic. However, patients are instructed that if they begin to feel anxious during the rapid-cycle breathing, simply to slow down to the medium-cycle breathing until they feel calm. Also, they should be advised to breathe gently and not to exhale too forcefully during cyclical breathing, as they may exhale too much CO₂ and induce tingling or cramping in the extremities. Patients with social phobia may have difficulty coping with the group situation at first. Such individuals should inform the teacher of their difficulty so that they can be given more support as they integrate into the group.

Post-traumatic stress disorder

A series of four open unpublished pilot studies were designed to develop a yoga program for the treatment of Vietnam veterans with post-traumatic stress disorder (PTSD).¹⁴ In Study 1, eight participants showed marked improvement in depression but not insomnia or anger expression during a 6-week program of Iyengar yoga postures.¹⁵ Mean scores on the Center for Epidemiological Studies Depression Scale (CES-D) and mean HRSD-17 scores dropped to a significant extent. Long-term improvement (21 weeks) was maintained with home practice and 1-hour group yoga sessions once per week. In Study 2, Iyengar poses for anxiety produced no additional benefit in eight veterans with PTSD and were therefore discontinued. In Study 3, eight PTSD veterans added Ham Su Meditation and *pranayama* to the Iyengar yoga postures for depression. These *pranayama* included *Ujjayi* breathing and another technique with prolonged expiration and end-expiratory breath hold. In addition to drops in CES-D and HDRS-17 scores, participants showed marked improvements in sleep initiation, disturbed sleep, flashbacks, and anger outbursts. Several subjects used the *pranayama* to calm themselves when they awoke at night or when they felt “road rage.” The most striking finding was that although yoga postures reduced depression, they had no impact on PTSD hyperarousal symptoms of sleep disturbance, flashbacks, or anger outbursts until *Ujjayi*, another similar *pranayama*, and meditation were added to the practice. Studies combining *pranayama*, meditation, and *asanas* may find that using synergistic yoga practices is far more effective for the full range of PTSD symptoms than any single practice.

Sageman¹⁶ found that patients with PTSD benefited from SKY training, noting that SKY courses include aspects of

cognitive-behavioral therapy and psychoeducation in human values of acceptance, social responsibility, and community service. SKY breathing sometimes evokes trauma-related sensations and affects in a safe, supportive setting. Brown and Gerbarg have observed that many patients with PTSD experience improvement in physical and psychologic symptoms.*[†] The overall effect is amelioration of feelings of fear, neglect, abuse, rejection, depression, isolation, and worthlessness. Patients with PTSD have a less stressful experience if they are told in advance about what occurs in SKY courses and the possibility of physical or emotional reactions. Usually the patient experiences release of painful emotions without consciously re-experiencing the trauma. The therapist should monitor the patient during and after the course to help in processing intense emotions that can be evoked.

CASE EXAMPLE

A 26-year old woman had been in weekly psychotherapy since her hospitalization at age 20 after a suicide attempt. She was stabilized on antidepressants and low-dose antipsychotic medication, which controlled her depression and dissociative symptoms. She experienced PTSD stemming from emotional and sexual abuse throughout her childhood. During psychotherapy many of her symptoms improved, and she was able to complete college, hold a job, and get married. However, she was tormented by severe temporomandibular joint (TMJ) pain that was set off by even minimal exertion such as walking. All standard medical treatments short of surgery had failed. Because she was under intense stress from her family, job, and husband, Dr. Gerbarg referred her to take a SKY course for stress reduction. On day 4 of the course, her TMJ pain remitted. She reported that on the days when she does her SKY practice she is pain free. When she skips her practice, some pain returns, but never as severe as before. It is unlikely that this was a placebo response, as she had not responded to other treatments. How did SKY work? One possibility is that through stimulation of nociceptive pathways, SKY blocked pain sensations or interrupted the spasm-pain cycle. Another possibility is that the pain and tension in the jaw were remnants of somatic reactions to oral sexual abuse and that, through its actions on the limbic system, thalamus, and cortex,¹ SKY enhances the plasticity of neural assemblies where trauma memories, impressions, and associations are stored. The in-

*Gerbarg, PL, Brown, RP. Yoga in psychiatry. In: Lake J, ed. *The Clinical Manual of Alternative and Complementary Treatments in Psychiatry*. Washington, DC: American Psychiatric Press, Inc., Washington, DC, 2006;in press.

†Gerbarg PL. Yoga and psychoanalysis. In: Anderson FS, ed. *Body to Body: Beyond the Talking Cure*. Hillsdale, NJ: The Analytic Press, Inc., 2006;in preparation.

crease in plasticity enables mutative changes in the configuration of neural connections and trauma-related symptoms.[†]

Many PTSD patients obtain substantial relief from SKY and make more rapid progress in therapy. SKY appears to complement traditional psychotherapy and can reduce the need for antidepressant and anxiolytic medication. Studies of SKY may lead to more effective approaches to the treatment of PTSD.

Bipolar disorder

Yoga should be used with caution in bipolar I disorder patients or unstable rapid cyclers. *Bhastrika* and rapid cyclical breathing and *Bhastrika* can induce mania. In addition, bipolar patients may overuse the practices for self-stimulation and inadvertently trigger psychosis. Many SKY teachers will not accept patients with bipolar diagnoses into their courses because of these risks.

It has been found that bipolar II patients whose hypomania is well controlled with antipsychotic medication and mood stabilizers other than lithium (yogic breathing can lower lithium levels by increasing lithium excretion) can benefit from SKY. However, patients must be carefully assessed, prepared with instructions on how to modify the breath techniques, and monitored during and after the course. The therapist should be given permission to speak with the SKY teacher and to provide contact information in case back-up is needed. Only experienced rather than newly trained teachers should work with bipolar II patients. These patients should be instructed to avoid rapid cyclical breathing or to do it very gently and only for brief periods of time at first. If it does not overstimulate them, they can gradually increase the length of practice with supervision. Patients taking lithium may be considered for yogic breathing if serum lithium levels are monitored and doses adjusted. Bipolar patients with predominantly depressive symptoms often respond well to *pranayama* and *asanas*.

Ujjayi breathing is safe and beneficial for most bipolar patients because it is calming as opposed to stimulating. For bipolar patients who are not stable enough to take SKY courses, the physician can help arrange for an instructor to teach them *Ujjayi*. This gentle *pranayama* may help reduce irritability, overactivity, insomnia, and anger. However, if agitation occurs, the *pranayama* should be discontinued.

Stress-related medical conditions

Numerous studies have found *pranayama* and *asanas* to be beneficial in stress-related medical conditions²: irritable bowel syndrome,¹⁷ asthma,¹⁸ hypertension,^{19,20} cardiopulmonary dysfunction,²¹ and in lowering of cholesterol levels.²²

Gerbarg and Brown have found SKY to be helpful in patients with a wide range of medical disorders including chronic fatigue, chronic pain, fibromyalgia, neck and back

pain, TMJ pain, cancer, diabetes, multiple sclerosis, and asthma.^{1,*} Reducing stress and anxiety are known to ameliorate pain and other stress-related symptoms. Further research is needed to understand better how yogic techniques help to improve medical conditions beyond the basic reduction of stress reactivity.

Addictions. Sixty (60) hospitalized alcohol-dependent patients were detoxified for 7 days and then randomly assigned to standard treatment plus SKY (group 1) or standard treatment alone (group 2) for 15 days.^{23,‡} In the group given SKY, the mean Beck Depression Inventory score was significantly reduced (from 39.7 ± 6.8 to 9.6 ± 3.7) more than in the standard treatment group (from 39.8 ± 5.4 to 16.4 ± 4.2) ($p < 0.0001$). Mean anxiety scores on the Beck Anxiety Inventory dropped more in the SKY group (from 36.8 ± 7.4 to 10.2 ± 3.0) compared with the standard treatment group (from 34.9 ± 6.8 to 15.7 ± 4.1) ($p < 0.0001$). In the SKY group, prolactin levels increased significantly and cortisol levels declined significantly compared to the control group ($p < 0.0001$). Significant electrophysiologic changes ($p < 0.0001$) were found in P300 components with increased amplitudes, associated with improved memory and attention.

Prison programs. Controlled studies of yoga breathing have not been conducted in adult prisons. However, in India, Europe, Africa, and the United States, SKY programs modified for prison populations have been taught to more than 100,000 prison inmates and staff. Brown and Gerbarg have viewed videotaped interviews with prison officials and Brown has visited several maximum security prisons in India to observe these programs. Prison authorities reported that even for violent criminals and terrorists in maximum security prisons such as Delhi's Tihar Jail and Patna's Beur Model Jail, SKY and other yoga programs significantly reduced violent behavior and improved quality of life for prison staff and prisoners. The benefits of these programs have been reported in the news media and other literature.²⁴⁻²⁷

A 4-month open pilot study of 86 juvenile 707B offenders (ages 13-18 years) convicted of violent crimes with deadly weapons (gang members of Los Angeles County) found that those given SKY training for 1 week (20-25 hours) in the Prison Smart Program followed by 30 minutes of guided meditation and *pranayama* 3 nights per week showed significant overall reduction in anxiety, anger, reactive behavior, and fighting.²⁸ Further studies are needed to develop the potential benefits of such programs in these challenging groups.

[‡]Vedamurthachar A. Biological effects of *Sudarshan Kriya* on alcoholics [dissertation]. Bangalore, India: National Institute of Mental Health and Neurosciences and Mangalore University, 2002.

Public health programs—emergency response

In real-world conditions of sudden mass disasters and war, controlled research studies are rarely possible. However, it is important to learn as much as we can from the experiences of first responders, relief workers, observers, and news reporters, and from official documents. For example, in a letter from the Ministry of Defence North-Caucasus Command, the Headquarters and Staff of MSP 503 MTD 19 Troop Unit No. 58 expressed gratitude to the International Art of Living Foundation for providing yoga breathing courses for soldiers with “battle psychic traumas” caused by the stress of fighting terrorists in Chechnya and other territories and for soldiers involved in the terrorist attack on the elementary School in Beslan in 2004. The letter refers to soldiers who were so traumatized that they became acutely suicidal and required 24-hour watching or “dynamic observation.” After taking the SKY course, 50% of them were no longer considered suicidal and were released from observation. The document states:

The breathing techniques, which were learned by the military men, help to increase workability and stamina in conditions of war, and the latter, in its turn, makes for better fulfillment of the tasks. The military men—soldiers and sergeants, who had mastered this technique, found out that their vitality and general physical and emotional state had improved. The psychologists of subdivisions marked that psychological test results of the military men under dynamic observation and making part of a risk group, have greatly improved after the trainings, and after breathing techniques above 50% of these military men were removed from dynamic observation.²⁸

Yogic breathing can be taught to large groups in just a few days. News and other media report that SKY has been used to relieve stress, anxiety, insomnia, depression, and PTSD after large-scale disasters such as war (Kosovo, Bosnia, Iraq, and Sudan),^{30,31} earthquakes (Gujurat, India earthquake 2000),^{32,33} floods (Iran 2004), terrorism (New York World Trade Center 9/11),³⁴ and the Southeast Asia tsunami (2004).^{35,36} Although scientific studies have not been conducted during these mass disasters, many survivors report that SKY improves daily functioning and helps to relieve anxiety, insomnia, depression, and flashbacks. The use of yogic techniques should be considered as an adjunctive treatment in emergency response planning.

Referrals, risks, and benefits

In general, patients with psychotic disorders, severe borderline pathology, or difficulty maintaining a sense of reality should not undertake SKY *pranayama* training. However, gen-

tle *Ujjayi* breathing under professional supervision is safe and can be helpful even in psychotic patients.^{36–38}

Pregnant women should not engage in breath-holding exercises, straining, or *Bhastrika*. Patients with high blood pressure, cerebral vascular disease, or migraine may not tolerate breath holding, *Bhastrika*, or head-down postures. A knowledgeable instructor is needed to modify the *pranayama* to reduce the risk of seizure in patients with epilepsy⁵ and to prevent CO₂ retention in symptomatic asthmatic patients. SKY is not generally taught to patients with seizure disorders. Patients with respiratory problems can improve pulmonary function through long-term practice of *pranayama*, but the techniques should be done more gently at first to reduce airway irritation. To avoid injuries, yoga stretches should be started gradually in accordance with each person’s physical condition.

Incorrect technique or the overuse of SKY breath practices beyond the prescribed time limits can cause dizziness, lightheadedness, irritability, euphoric states, or psychosis in vulnerable patients, particularly those with bipolar disorder, dissociative disorders, or schizophrenic spectrum illnesses. The risk of adverse events can be minimized by appropriate patient screening when making referrals and by collaboration with a competent yoga instructor.

Many physicians and other health care professionals participate in SKY courses. First-hand knowledge of yoga techniques prepares the physician or health care provider to assess the qualities of yoga instructors, to make appropriate referrals, to prepare patients for courses, to support their daily practice, and to integrate yoga lessons into the overall treatment. SKY training has helped hundreds of health care professionals to overcome the effects of work stress and to function with more energy, focus, and empathy.

CONCLUSIONS

Although controlled clinical trials are needed to document the benefits of programs that combine *pranayama*, *asanas*, and meditation, there is now sufficient evidence to consider *Sudarshan Kriya* Yoga as a potentially beneficial, low-risk adjunct for the treatment of stress, anxiety, PTSD, depression, stress-related medical illnesses, and substance abuse, and for the rehabilitation of criminal offenders. Yoga techniques have historically been found to enhance well-being, mood, attention, mental focus, and stress tolerance. Proper training by a skilled teacher is essential for the safe and effective use of yoga. Daily practice will maximize the benefits. Programs that provide weekly follow-up sessions and group support improve compliance. Health care providers can play crucial roles in making appropriate referrals and in encouraging patients to maintain their yoga practices.

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