



SRI SRI INSTITUTE FOR ADVANCED RESEARCH

Art of Living Research Wing

A White Paper Series on Sudarshan Kriya

A White Paper on Sudarshan Kriya and Mental Health

Introduction

Mental health

The World Health Organization defines mental health as not just the absence of mental illness, but rather a state of well-being in which individuals are able to cope well with the normal stresses of daily life. Good mental health enables a person to recognize their abilities, work productively, and make meaningful contributions to their community. Mental health is like physical health - everyone has it in varied degrees, ranging from very poor to very good, and it requires care and attention to stay mentally fit.

Deteriorating mental health is a major concern in today's world. Mental health crisis has never been more at the forefront than at present. The COVID-19 pandemic and ensuing consequences of social isolation, economic instability, uncertainty about the future, unemployment, and loss of loved ones have created enormous mental strain on families & individuals. According to 2021 Mental health report, a large percentage of population experienced poor mental health and participated in substance abuse globally during the pandemic. The pandemic affected the mental health of 59% of people negatively in United states alone. A recent report by World Health Organization (WHO) estimates that about 7.5 percent of Indians suffer from some mental health disorder and predicts the number will continue to increase in the upcoming months. It estimates that 56 million Indians suffer from depression and another 38 million Indians suffer from anxiety disorders.

Mental health is a complex phenomenon. In the past, mental health has been confused with poor mental health. For decades, the focus of mental health research and discussions was primarily centered around poor mental health and mental health disorders like depression, anxiety etc., which require medical attention. A brief description of Anxiety and Depression is included below. Several other disor-

ders linked to poor mental health are described in relevant white papers. Abundant information (symptoms, risk factors etc.) about mental health disorders is also available online.

Anxiety

Occasional anxiety, stress and worry are common across the board. Anxiety disorder is defined as a state of constant worry and fear about the un-certainties of life. Reports from the National Health Survey, conducted by the Center for Disease Control and Prevention, document that women were more likely to experience anxiety symptoms than men. Risk factors for anxiety include physical ailments such as hyperthyroid, heart problems and lifestyle choices such as excess caffeine consumption.

Depression

Depression is a common mental disorder affecting more than 322 million people worldwide. These numbers have gone up considerably in the last year due to the social isolation imposed by the pandemic. According to the International classification of diseases, ICD-10, provided by the World Health Organization, the presentation of depression can be classified as mild, moderate or severe based on its symptoms. The effects of depression can be long-lasting and lead to further complications. At its worst severity, depression leads to suicide. More than 8,00,000 deaths are attributed to suicide every year. A complex dynamic between the social, psychological and biological factors results in depression. As per NMHS (2015-16) in India, one in 20 (5.25%) people over 18 years of age have suffered from depression at least once in their lifetime, amounting to a total of over 45 million persons with depression in 2015. Depression is different and more protracted from the usual mood fluctuations and short-lived emotional responses to the challenges of everyday life.

Positive Mental Health

For several decades, the sole focus of mental health research was around mitigation of mental health disorders like depression and anxiety. However, in the recent decades there has been an increased focus on positive mental health and how to enhance it. As mentioned earlier, good mental health is not just an absence of mental disorder, but rather a state of positive mental wellbeing. Recently, there is a greater cognizance and research around positive mental health and its contributing factors, including obvious ones like happiness and satisfaction with life.

There are several others traits that are linked to improved mental health such as good coping skills which refer to the ability to cope with unfavorable, stressful situations in life. Another factor linked to positive mental health is resilience. Resilience is the ability to withstand unfavorable situations and bounce back from difficult life events. Being resilient does not mean that people don't experience

stress, emotional upheaval, or suffering. Some people equate resilience with mental toughness, but demonstrating resilience includes working through emotional pain and suffering. Other attributes linked to good mental health include ability to manage negative emotions, having strong interpersonal relationships, self efficacy, and experiencing gratitude, optimism and meaning in life. The field of positive psychology is devoted to the study of the above.

Just like good physical health requires attention & action, so does mental health. Some of the lifestyle factors that can affect the state of our mental health are excessive stress, interpersonal relationships or lack thereof, addictions, exercise, dietary habits and sleep. Maintaining a healthy lifestyle with moderate stress (because in today's world, having no stress is next to impossible), exercise (both physical and mental), healthy eating habits, rich social relationships and good sleep are necessary to experience good mental health. Ancient Wisdom of yoga and meditation are now being rediscovered as a tool to not only support physical health, but also to increase our mental wellbeing.

Sudarshan Kriya Yoga(SKY)

Sudarshan Kriya Yoga is a technique taught by the Art of Living Foundation in more than 156 countries with more than 6 million practitioners across the globe. It is taught in different modules across various age groups in multiple parts of the world.

SKY is a cyclic rhythmic breathing technique with its roots in traditional yoga. The 25 minutes process includes three yogic components – pranayama, Om chanting and Sudarshan Kriya. The pranayama is done using the Ujjayi breath. Ujjayi involves experiencing the conscious sensation of the breath touching the throat. This slow breathing technique is performed at a rate of 2–4 breaths per minute (bpm). This technique improves lung capacity, allowing more air to pass through the lungs. 'Om' is chanted three times with prolonged exhalation. Lastly, Sudarshan Kriya rhythmic breathing is done in two variations:- long SKY, which is done with Gurudev Sri Sri Ravishankar's recorded instruction, and short SKY which can be done at home taking slow (20 bpm), medium (40–50 bpm), and fast (60–80 bpm) breaths. The entire technique is done in a seated posture with eyes closed.

Summary of Research Studies:

Several research studies have investigated the impact of SKY on Mental health and well-being. These studies range from assessing the impact of SKY on patients with major depressive disorder to investigating its effect on college students and on general population during the pandemic. Studies have assessed various parameters such as stress, anxiety, depression, happiness, quality of life, resilience, and social connectedness to name a few.

Please refer to white papers on youth mental health and child & teen mental health for research studies that assess impact of SKY on the mental health of young people. The white paper on vulnerable populations details research that has been conducted on SKY and mental health of vulnerable populations, for eg, those who have experienced trauma or have experienced or inflicted violence.

Research studies on Sudarshan Kriya Yoga (SKY) and Mental Health

Research Summary Section 1: Studies on General Population

Most studies on general population focus on the impact of SKY on mitigating stress and anxiety as well as enhancing positive mental health qualities such as life satisfaction, quality of life and subjective happiness. A total of 6 studies have been conducted on Sudarshan Kriya Yoga's impact on the mental health of general population. First 2 are studies that assess the benefit of SKY during the COVID pandemic. The third study is a cross-sectional study on experienced practitioners. The last 3 studies are pre and post studies that investigate the impact of SKY immediately as well as at 6 weeks of SKY practice.

1.1 Association Between SKY and Mental health of Indians during COVID-19

COVID-19 created a negative impact globally, mimicking a war-like situation. India was no exception. The pandemic created fear and anxiety in the minds of people, affecting their health and well-being. Parimala and Kanchibhotla^[1] conducted a study with the aim of capturing the prevalent stress and anxiety levels in 956 adults during the early part of the pandemic, and to highlight any differences between coping abilities of yoga vs. non-yoga practitioners. In this study, the mental health of Sudarshan Kriya Yoga (SKY) practitioners was compared with the general population and non-SKY practitioners. Results show that 33% of non-SKY practitioners experienced anxiety due to the pandemic, while a

lower number of SKY practitioners, 17.7%, experienced anxiety due to the pandemic. This trend was also reflected in self-reported mental health. A total of 56.21% of non-SKY practitioners reported a negative change in their mental health compared to only 40.6% of the SKY population.

Summary: Parimala and Kanchibhotla evaluated 956 people using self-reported mental health and anxiety measures in the early part of the pandemic. A reduced negative impact of the pandemic on the mental health of SKY practitioners was observed (almost half), compared to the general population and non-SKY practitioners. This strengthens the evidence that yogic methods, especially SKY practice, are highly effective in maintaining mental well-being, even during difficult situations and hardship.

1.2 Effect of Sudarshan Kriya Yoga on well-being of healthcare professionals during the early part of COVID-19 Pandemic

Health Care Professionals (HCPs) in India face numerous challenges working in overburdened and inadequate health care facilities. COVID-19 heightened their work stress and professional difficulties. Being on the frontline of the pandemic, HCPs not only ran a greater risk of exposure to the highly infectious virus, but also experienced higher levels of physical and mental stress, anxiety, depression, burnout, insomnia and stress-related disorders. A study conducted by Kanchibhotla et al.^[2] during the pandemic focused exclusively on investigating the impact of Sudarshan Kriya Yoga (SKY) on the well-being of HCPs in India. 92 HCPs participated in the study. They were taught SKY in a 4-day online breath and meditation workshop. Outcomes related to depression, anxiety, resilience, life satisfaction, and sleep quality were measured. A significant reduction was observed in stress (dropped by 36.84%), anxiety (dropped by 27.39%) and depression (reduced by 46.75%) immediately after the SKY program. There was also a significant improvement in resilience and life satisfaction immediately after the program, and it continued to increase through 40 days of practice, signifying a persistent positive effect of SKY. At Day 40 of practice, resilience scores were greater by 27% compared to baseline. In addition, quality of sleep improved immediately post intervention and continued to improve through day 40 of practice. At day 40 of SKY practice, all the study participants reported being highly satisfied with their lives, and no one scored in the extremely dissatisfied category.

Summary: A study by Kanchibhotla et al. including 92 HCPs showed that after 40 days of SKY practice, HCPs working on the frontlines during the COVID 19 pandemic reported a 36.84% decrease in stress, 27.39% decrease in anxiety and 46.75% decrease in depression, suggesting that SKY practice had a positive influence on them. This is very significant as the data collection for this study took place

when India was in a state of lockdown. Not only was there a great anxiety among the people, effective therapeutic options for COVID-19 were also not available. At such a time, HCPs were under tremendous pressure. Despite being in such an extraordinarily dire situation, SKY created a sense of positive mental well-being in them. The HCPs reported improved sleep and resilience, as well as greater satisfaction with life after the practice of SKY.

1.3 Effect of Sudarshan Kriya Yoga on stress reduction among the general population

A cohort study by Patil et al.^[3] studied the effect of SKY on reducing stress among the general population. This cross-sectional study compared a group of participants who had been regularly practicing SKY for more than 6 months, with those who engaged in alternate stress relieving measures (SRM) such as walking, pranayama and going to the gym. Both groups consisted of 100 participants each, and faced comparable stressors during the study period. The outcomes measured in the study included sleep patterns, ability to focus, degree of happiness, anger, frustration, optimism, and consumption of substances such as alcohol and tobacco. Upon analysis, the scores were markedly different between the two groups. Non-SKY practitioners experienced a higher level of stress than SKY practitioners while undergoing similar stressful conditions. The SKY group demonstrated an increased level of happiness by 3.43 times, a higher concentration level by 2.33 times, better sleep quality by 3.9 times, increased optimism by 6.9 times and reduced consumption of alcohol/tobacco/cigars by 1.6 times. The study results highlight SKY as an effective technique to mitigate daily stress, and improve happiness, sleep and concentration.

Summary: SKY alleviates stress in the general population more effectively compared to other stress relieving measures. A cohort study by Patil et al., compared SKY and other stress releasing measures among 100 SKY practitioners and 100 age matched controls. SKY had a positive effect on physical and mental health of its practitioners. People who practiced SKY showed higher levels of happiness by 3.43 times, better concentration by 2.33 times, and deeper sleep quality by 3.9 times. SKY is a low risk, low cost option to mitigate stress and its adverse effects on the human body.

1.4 Impact of a Comprehensive Yogic Breathing Program on Wellness among Healthy Adults

A study by Kjellgren et al.^[4] investigated the impact of SKY on the well being of 103 healthy adults. Of the 103, 48 participants experienced a 6 day SKY intervention. The remaining 55 individuals comprised the control group and meditated with their eyes closed for 15 minutes daily. The study measured the following well-being outcomes: anxiety, depression, optimism, stress and energy levels. The parameters were measured before the intervention, and after 6 weeks of SKY practice. The experi-

mental group practiced SKY daily for these six weeks. The control group meditated for 15 mins daily with their eyes closed. The results at the 6 week assessment showed a marked difference between the baseline and post SKY practice data for the experimental group, while no such difference was noticed in the control group. A decrease in depression scores (33.57%), stress scores (17.7%) and anxiety scores (22.76%) was noticed after 6 weeks of SKY practice. No significant change was observed in the control group after 6 weeks. Therefore, the findings indicate improved wellness among individuals who practice SKY.

Summary: The impact of SKY on the well being of 103 healthy adults was studied by Kjellgren et al. at baseline and after 6 weeks of practice. SKY intervention was compared with a 15 minutes self meditation practice and it was shown that SKY practice has a significant effect on reducing depression, anxiety and symptoms of stress, even among healthy individuals. A reduction of 33.57%, 17.7%, 22.76% was noticed in the outcomes of depression, anxiety and stress respectively after six weeks of SKY practice. SKY was also found to increase optimism in one's life.

1.5 Effect of Sudarshan Kriya Yoga on overcoming stress and improving social connectedness

SKY was studied as a potential remedy to overcome loneliness and improve the sense of social connectedness. Kanchibhotla et al.^[5] studied 473 participants who enrolled in a three day SKY workshop. Social interaction and stress level of the participants was assessed at three different time points; day 0, day 4 (immediately after the workshop) and at day 40 after the workshop. The assessment was conducted using a set of standard questionnaires, namely the Perceived Stress Scale and the Social Connectedness Scale. A 28% rise was noticed in the mean scores of social connectedness on the day 4 assessment. The scores further rose to 42% on the day 40 assessment. The results also demonstrated a correlation between the decrease in stress levels and an increase in social connectedness. A 24.5% reduction in stress was noted on the Day 40 assessment, coincident with the rise in social connectedness mentioned above. The changes in the participants correlated with the frequency of SKY practice. Participants who practiced SKY daily showed an almost 50% improvement in the measures of social connectedness.

Summary: Humans are social beings and require healthy, close personal and social relationships to experience good mental health. 473 participants who enrolled in SKY workshop were recruited for a study conducted by Kanchibhotla et al. The participants were assessed at three different time points; day 0, day 4 (immediately after the workshop) and at day 40 after the workshop. The authors found a 40% improvement in social connectedness and a 24.5% reduction in stress after 40 days of SKY practice. The higher the frequency of SKY practice, the greater was the effect on improving social

connectedness. Yogic practices like SKY can be an effective tool for overcoming loneliness and reducing stress.

1.6 Impact of Sudarshan Kriya Yoga practice on internet dependency and social connectedness

Excessive internet use or internet dependency is a behavioral addiction that can lead to inferior quality of life, poor physical health, mental illness and social disconnectedness. India has reported the second-highest internet use in the world, with more than 696 million users. A cross-sectional study conducted across India by Kanchibhotla et al.[6] assessed 769 participants for internet dependency and social connectedness using Internet addiction test and social connectedness scale for 3-months. The data was collected via an offline survey at the Art of Living International center. The study groups consisted of 497 SKY practitioners who had participated in at-least one SKY follow-up session within the past 6-weeks (SKY group), and 272 non-SKY practitioners (non-SKY group). The non-SKY group reported an increased internet dependency compared to SKY practitioners by 12.68%. Scores were higher among non-SKY practitioners in all six domains of internet dependency i.e excessive use, neglect of social life, absence of control, neglecting work, anticipation and salience. Increased anticipation scores reflect anxious waiting for a particular event to happen while salience highlights noticeable or important prominence given to a particular event, in this case receiving a text on the internet or watching a video premiere. Increased IAT scores reflect a tendency to avoid social life or work due to internet addiction. It was noted that non-SKY practitioners had higher IAT scores. Correlation of internet dependency with poor social life was also observed in the scores obtained on the Social Connectedness Scale. The non-SKY group had lower SCS scores compared to the SKY population. The study highlights the importance of SKY practice in helping resist behavioral addictions and maintaining a robust social life .

Summary: The last few decades have seen an increasing use of smartphones, and mushrooming of multiple social media platforms. This has led to growing Internet dependency, which in turn has affected the quality of life and social connectedness among users. 497 SKY practitioners who had participated in at-least one SKY follow-up session within the past 6-weeks, and 272 non-SKY practitioners were compared for internet dependency and social connectedness. The study revealed that SKY practitioners are less addicted to the internet and have higher social connectedness. The level of internet dependency was found to be 12.68% higher among the non-SKY group than the SKY group. Internet dependency is correlated with lower social connectedness, as observed in the scores on the social connectedness scale (SCS). Non-SKY group had lower SCS scores. This highlights the importance of SKY in protecting against behavioral addictions and promoting a wholesome quality of life.

Research Summary Section 2: Studies on Individuals with Post traumatic stress disorder

Post-traumatic stress disorder (PTSD) can develop after an extremely stressful or a distressing event that causes prolonged trauma, fear or shock in a person. The trauma can have long-term effects, including flashbacks, difficulty sleeping and anxiety. Examples of events that can trigger post-traumatic stress disorder (PTSD) include wars, crimes, fires, accidents, death of a loved one, or abuse of some form. A feature of PTSD is recurring thoughts and memories of the event, even though the danger has passed. PTSD can disrupt a person's life for years. Four studies (2 RCTs, one feasibility study and one non randomized control study) have explored the impact of SKY on PTSD among veterans and survivors of natural disasters.

2.1 Post-traumatic stress relief among Vietnam Veterans following Sudarshan Kriya Yoga practice

A randomized waitlist control study done by Carter et al.[7] investigated the impact of SKY on PTSD symptoms in Vietnam veterans who were resistant to several other PTSD treatments. The research team enrolled 25 male veterans into two groups viz. SKY group (n=14) and the wait-list control group (n=11) which also received SKY after 6-weeks. The study compared the scores of veterans from the SKY group with the waitlist control group and pre-post within the SKY group as well. The severity of PTSD was measured at the following timepoints: at baseline, 6 weeks after SKY and 6 months after SKY. Other measured outcomes included depression, quality of life and alcohol consumption. After 6 weeks of practice, the SKY group showed a 25.2% decrease in severity of PTSD symptoms, however, veterans in the wait-list group showed no changes during this time. The wait-list control group also received SKY intervention after 6 weeks. Once the wait-list group also experienced SKY, their scores on the scales measuring PTSD symptoms severity declined by 45.8% post 6 week practice of SKY. Depression scores reduced by more than 31.6% after 6 weeks of SKY practice. Alcohol consumption also reduced by 19% after 6 weeks of SKY practice. Furthermore, at the 6 month time point, the group showed further reduction in PTSD symptom severity by 37.76% with SKY practice. The overall results indicate that SKY intervention could be an effective adjunct treatment to reduce symptoms in veterans with PTSD.

Summary: A randomized waitlist control study by Carter et al. on 25 male veterans was conducted to assess the efficacy of SKY in reducing PTSD severity amongst Vietnam veterans. The results demonstrated a 25.2% decrease in PTSD symptoms after 6 weeks of SKY practice and a further decline from

baseline by 37.76% after 6 months. Meanwhile, veterans in the control group, who didn't receive SKY, showed no change in their scores on the PTSD CAPS scale after 6-weeks. This emphasizes the effectiveness of SKY practice in reducing symptoms of PTSD.

2.2 PTSD measures among U.S. military group after Sudarshan Kriya Yoga practice

A randomized control trial conducted by Seppala et al.[8] examined the effects of Sudarshan Kriya yoga (SKY) on PTSD related measures among 21 U.S. male veterans of the Iraq or Afghanistan war. The SKY group consisted of 11 veterans, and the control group consisted of 10 veterans who received delayed intervention. The parameters assessed were stress (PTSD military version scale), mood and anxiety. The outcomes were measured at baseline prior to the SKY workshop, 1 week after the workshop, 1 month after the workshop and 1 year after the workshop. The results showed that the veterans who practiced SKY had lower PTSD scores and anxiety symptoms during the course of the study. However, the control group did not show any improvement during the study period. For the veterans who received SKY, the PTSD scores decreased by 28.86% from baseline at 1 week evaluation time point, 21.67% at 1 month, and 30.07% at 1 year time point. The mood and anxiety scores improved by 21.56% after the SKY practice at 1 week evaluation. Data analysis revealed that SKY had the strongest impact on reducing hyperarousal and re-experiencing symptoms. With regard to PTSD symptoms, in the General Distress-Anxiety domain of Mood and anxiety questionnaire, the SKY group showed fewer symptoms. Authors concluded that SKY had high acceptability as an intervention among the U.S. military veterans and may have clinical utility.

Summary: A randomized control trial by Seppala et al. including 21 U.S. male veterans of the Iraq or Afghanistan war with PTSD symptoms, demonstrated that the PTSD scores and anxiety symptoms reduced with the practice of SKY. Significant difference was noted within 1 week of the intervention. Results showed that the PTSD scores reduced by 28.86% in a week and reduced further after one year of practice (by 30.07%)

2.3 Sudarshan Kriya Yoga and PTSD : A Feasibility Study

Vasudev et al.[9] investigated the feasibility of offering a SKY based program to patients with PTSD. The single arm study measured the severity of anxiety, depression and symptoms of PTSD in 19 individuals suffering from PTSD. Data was obtained before the SKY intervention, and after 12 weeks and 24 weeks of SKY practice. Results showed a clinically significant improvement (decrease by 23.9%) in

PTSD symptoms scores at week 12 of SKY practice, compared to baseline. A 23.7% improvement in depression scores, and an 11.9% improvement in anxiety scores was also documented at the 12 weeks assessment. The study results demonstrate clinically significant benefits of SKY on the symptoms of PTSD, as well as associated depression and anxiety. Symptom reduction persisted at week 24, even though the formal interventional support ceased after week 12. This highlights the sustainability and long-term efficacy of SKY practice.

Summary: Vasudev et al. evaluated the impact of SKY technique on 19 individuals suffering from PTSD symptoms, demonstrating that the practice of SKY led to significant improvements in symptoms of PTSD, as well as in associated depression and anxiety. Data was obtained before the SKY intervention, and after 12 weeks and 24 weeks of SKY practice. There was a clinically significant improvement (decrease by 23.9%) in PTSD symptom scores at week 12 of SKY practice, compared to baseline scores. Symptoms of depression and anxiety also decreased, by 23.7% and 11.9% respectively, after the SKY intervention. The symptoms further reduced at the 24 week assessment, even though the formal intervention support ceased after week 12. This highlights the sustainability and long term efficacy of SKY practice.

2.4 Effect of a Sudarshan Kriya Yoga on PTSD and depression among the survivors of the 2004 South-East Asia Tsunami

Natural disasters like earthquakes, tsunamis, and strong cyclones can lead to PTSD in survivors. A non-randomized study was conducted by Descilo T et al.^[10] to evaluate the effect of a yoga breath program, including Sudarshan Kriya Yoga (SKY), on 183 survivors of the 2004 Asian tsunami. The outcomes measured included the severity of PTSD and depression. Assessments were conducted at baseline just before starting the program; and at 6, 12 and 24 weeks. The study included three groups: SKY group, SKY plus exposure therapy (SKY+TIR) and the control group (no intervention). The results showed that, at 6 weeks, the effect of the SKY intervention was significant compared to the non-participating control group. There was a 64.06% decrease in the PTSD scores in the SKY group and 61.62% decrease in the SKY+TIR group. a 86.9% drop in the depression score in the SKY group and 84.2% reduction in the SKY+TIR group at the 6 weeks assessment. The improvements were maintained at the 24-week follow-up, and were almost similar for the SKY and SKY+TIR groups. In the control group, which didn't receive any intervention, the PTSD score reduced by only 6.7%, while depression score reduced by 5.5%.

Summary: A non-randomized study by Descilo et al. evaluated the effect of a yoga breath program, including Sudarshan Kriya, on alleviating the symptoms of PTSD and depression among 183 survivors

of the 2004 Asian tsunami. Assessments were conducted at baseline just before starting the program; and at 6, 12 and 24 weeks. The results showed that Yoga breath-based SKY and trauma reduction exposure techniques may be effective in providing rapid and sustained relief for PTSD and depression symptoms in the survivors of a mass disaster. The intervention group recorded a 60% reduction in the PTSD scores and a 90% reduction in the depression scores. However, the control group had a very small change in scores during the study duration of 24 weeks.

Research Summary Section 3: Studies on individuals experiencing Anxiety and Depression

The impact of SKY on depression and anxiety has been an important area of interest. Multiple forms of depression have been studied. A total of 9 studies (6 on depression, 2 on Generalized Anxiety Disorder and one on both) investigate the impact of SKY on individuals who experience depression and anxiety.

3.1 Sudarshan Kriya Yoga As Adjunct Treatment In Major Depressive Disorder

A randomized control trial conducted at the University of Pennsylvania by Sharma et al.[11] investigated the impact of SKY on Major Depressive Disorder. A total of 25 adult outpatients, aged 18–67 years, who did not experience an improvement in depression after ≥ 8 weeks of antidepressant treatment, were enrolled in the study. They were randomized to the SKY group (n=13) or the control group (n=12). The SKY technique was taught over 6 sessions to the SKY group. Participants were asked to continue practicing at home for 8 weeks and attend a weekly group practice session. Severity of depression and anxiety was assessed using HDRS-17 and BDI scales. Scores were calculated before starting SKY, at 30 days of SKY and at 8 weeks of SKY practice. At the 8 weeks assessment, the BDI scores reduced by 17.23 points in the SKY group, compared to a drop of 1.75 points in the control group. There was a 52.5% decrease in HDRS scores and a 62.3% reduction in depression scores at 8 weeks for the SKY group. These findings, along with a high subject completion rate of 77%, support the feasibility of SKY as an intervention for MDD outpatients. More than half (54%) the population in the SKY group showed a greater than 50% improvement in their symptoms.

Summary: A randomized control trial conducted by Sharma et al. at the University of Pennsylvania studied the impact of SKY on 25 patients suffering from Major Depressive Disorder patients. The study included patients who were suffering from depression and were unresponsive after >8weeks of thera-

py in an outpatient setting. The results showed a 52.5% decrease in depression scores as measured by HRSD and a 62.3% reduction in depression scores with 8 week practice of SKY as measured by BDI. More than half (54%) the population in the SKY group showed a greater than 50% improvement in their symptoms. This is significant as these patients had not responded to antidepressant medication for >8 weeks previously. This demonstrates the effectiveness of SKY as an adjunct therapy for patients with major depression who have not responded to antidepressants.

3.2 Antidepressant effect of Sudarshan Kriya Yoga in patients with melancholic depression

Janakiramaiah et al.[12] studied the antidepressant effect of SKY in patients with melancholia. Melancholia is a subtype of major depressive disorder. In a prospective randomized controlled trial, patients with melancholic depression were provided SKY intervention and evaluated after 4 weeks of SKY practice. Consenting, untreated patients with melancholic depression (n=45) were hospitalized and randomized into three equal treatment groups namely SKY, ECT (electroconvulsive therapy or shock treatment) and antidepressant medication Imipramine, with a total of 15 members in each group. HRSD (Hamilton rating scale for depression) and BDI (Beck depression inventory) questionnaires were used to monitor the effects of various interventions. Patients were assessed at recruitment (baseline) and weekly thereafter for four weeks. A reduction in the depression scores was noted for all three groups. At week three, the SKY group had scores similar to the medication group, indicating SKY had the same effect of treatment as the antidepressant medication Imipramine. SKY produced a 67% remission rate and stability of the response was shown. The benefit of SKY in melancholic depression was comparable to the standard antidepressant medication.

Summary: Janakiramaiah et. al. studied the antidepressant effects of SKY in 45 patients with melancholic depression, along with the remission post SKY treatment. SKY produced a 67% remission rate in patients with depression and stability of the response was shown post 4 weeks of practice. The benefits of SKY were comparable to the standard antidepressant medication. SKY can be a potential alternative to drugs as a first line treatment for melancholia. SKY is better tolerated than electroconvulsive therapy or shock treatment. The side effects due to medication can be avoided as well. The fact that antidepressant effect was demonstrated in hospitalized patients shows that the response to SKY is not just a placebo effect.

3.3 Effect of Sudarshan Kriya Yoga on P300 Amplitude in Dysthymia patients

Murthy et al.[13] studied the impact of SKY practice on dysthymia (persistent depression). This study compared the P300 amplitude and depression scores in 24 patients diagnosed with depression: 15 with dysthymia and 9 with melancholic depression. The control group consisted of 15 healthy individuals normal on P300 and depression scale. P300 is a wave potential produced during an event. EEG of patients with depression shows a lower abnormal P300 ERP amplitude compared to healthy adults. At baseline assessment prior to the intervention, subjects suffering from depression demonstrated an abnormal and lower EEG brainwave, measured by their P300 ERP amplitude, as compared to healthy adults. Patients suffering from depression were provided SKY as an intervention and were encouraged to practice it daily for 90 days. Post 90 days of SKY, a significant improvement was noted in the depression scores as measured by the P300 amplitude and standardized scales. By Day 90 P300 ERP amplitude in patients with depression who practiced SKY were similar to that of healthy individuals, indicating the effectiveness of SKY practice in treating depression.

Summary: Murthy et al. studied the efficacy of SKY amongst 24 dysthymic patients. The study compared the depression scores and P300 ERP amplitude readings of patients with depression with healthy controls. At baseline, the readings of patients with depression were found to be lower in amplitude and abnormal, compared to healthy controls. The patients suffering from depression were provided SKY and the readings were recorded again after 90 days of SKY practice. At the 90 day assessment, the EEG pattern in patients with depression who practiced SKY was similar to that of healthy individuals, indicating the effectiveness of SKY practice in treating depression.

3.4 Antidepressant effect of Sudarshan Kriya Yoga (SKY)

Murthy et al.[14] studied the impact of SKY on depression. Thirty consenting, medication-free adults diagnosed with depression (15 diagnosed with dysthymia, 15 diagnosed with melancholia) were enrolled in the study. EEG was recorded at baseline, i.e before the SKY intervention. SKY was provided as the sole intervention and participants were assessed clinically for depression using questionnaires at the following time points: pretreatment, 1 month post SKY and 3 months post SKY. Overall, twenty-two patients out of 30, demonstrated an improvement in clinical depression with SKY. Patients who scored less than 2 on clinical global impression scale at both 1 and 3 months post SKY were classified as responders (10 dysthymics and 12 melancholics). Responders (n=22) and non-responders (n = 8) did not differ on any of the variables including baseline depression scores. At 1 month assessment, the

mean total depression score of responders was significantly lower than that of non-responders. Scores measuring depression dropped by 72.05% and 63.6% at one month assessment on two different scales (HRSD and BDI respectively). The antidepressant effect of SKY (reduction in HRSD scores) after 1 month of practice were significant even after excluding the anxiety items of HRSD. This supports that SKY has independent antidepressant effects, outside of its anti-anxiety effects. The observation that the pretreatment P300 amplitude did not predict variation in treatment response, indicated a uniform response to SKY therapy. Therefore, SKY can be utilized as an effective technique to alleviate the symptoms of mild to moderate depression and to promote better mental health.

Summary: A study by Murthy et al. assessed the antidepressant effects of SKY on 30 patients suffering with depression. The assessment was done at baseline, after 1 month and 3 months post SKY. The study demonstrated a significant drop in depression scores by 72.05% and 63.6%, as measured by two different scales. The results were observed within 3 weeks of SKY intervention which is quicker than the usual antidepressant medication.

3.5 Antidepressant effect of Sudarshan Kriya Yoga (SKY) in Dysthymic Disorder

Shetty et. al.^[15] studied the impact of SKY on dysthymic disorder. Dysthymic disorder is a chronic depressive mood disorder. Forty six (46) outpatients, 22 males and 24 females in the age range of 18 to 46 years of age, were enrolled in the study. Study participants learnt SKY and were asked to practice it daily for 3 months. Study participants did not take any anti depressant medication for the study duration. Participants were assessed via video interviews and self-report scales at baseline (pre intervention), at one month and 3 month post intervention. Thirty seven (37) patients completed the treatment through three months, and 25 (68%) of them reported only mild symptoms at the end of the study, hence experienced remission. For a high proportion of those practicing SKY regularly, the symptoms of dysthymia almost ceased. A 64% drop in the anxiety scores and 68.5% drop in the depression scores was recorded at 3 months. The typical placebo response rate in patients with dysthymia for any intervention is 18% and it disappears by 5 weeks. In this study, it was observed that the therapeutic effect of SKY persisted till 3 months, indicating that it was not a placebo response. There was a 68% remission (higher than placebo) in SKY practitioners, which also makes the placebo response unlikely.

Summary: SKY can be effective as the sole treatment for dysthymic disorder. A study by Shetty et al. enrolled 46 patients with dysthymic disorder. The assessments were done at pretreatment, 1 month post SKY and 3 months post SKY. Regular practice of SKY helps in remission, as shown in 68% of the study population at 3 months. A 64% drop in the anxiety scores and 68.5% drop in the depression

scores was recorded at 3 months. SKY has the advantage of making the patients self reliant and reducing health care costs.

3.6 Equipotent efficacy of Long and Short Sudarshan Kriya Yoga In Major Depressive Disorder

Vangala et al.[16] conducted a comparative study to elicit any differences between the effects of Short and Long Sudarshan Kriya Yoga (SKY) in major depressive disorder. Fifteen (15) individuals (mean age 29.5 yrs) with a diagnosis of major depressive disorder received daily Long SKY for 4 weeks; 15 other individuals (mean age 34.2 yrs) with a diagnosis of major depressive disorder received daily short SKY (home practice) for 4 weeks. All subjects completed the Depression Inventory and the Anxiety Inventory every week. Results showed that the overall depression and anxiety scores of subjects in both groups decreased significantly and equally during the course of the study. Twelve (12) among the Long SKY group and 7 among the short SKY (home practice) group achieved a reduction up to 50% in the depression scores.

Summary: Vangala et al.compared the efficacy of short and long SKY among 30 individuals suffering from depression. The assessments done at baseline and at 4 weeks revealed that both short and long SKY are equipotent in their antidepressant and antianxiety effects in major depressive disorder. Individuals showed as much as 50% reduction in depression in only 4 weeks. This demonstrates the importance of home practice of SKY (short SKY).

3.7 Therapeutic effects of Sudarshan Kriya Yoga on mild-moderate depression and anxiety disorders

The UK based National Health Service (NHS) developed a national program to improve access to treatment for depression and anxiety. As a part of this NHS service, people who suffered from low intensity anxiety/depression symptoms were referred to a workshop known as Manage your Mind, which included SKY. Hamilton-West et al.[17] studied the effect of this workshop on anxiety and depression. Patients from South East England, between the ages 14 to 80 years, with mild-to-moderate depression and anxiety participated in the study (n=991). The medication data indicated that 206 participants (20.8%) were taking medication for depression and/or anxiety at the time of the study, while 785 (79.2%) were not on any medication. SKY program was delivered as four weekly hour long 'stress buster sessions', followed by one weekend intensive workshop (2.5 days) and four weekly (90 min) follow-up sessions. Workshops were facilitated by certified SKY instructors. The scores for depression and anxiety were calculated before SKY, once every week during the study, and at the end of the last

weekly session. Median anxiety (GAD) scores for those who completed the program reduced by 30% and median depression (PHQ) scores reduced by 22%. Almost twice as many participants reported a <5 score on both GAD & PHQ scales at the final assessment, compared to pre-treatment, indicating they were no longer experiencing depression or anxiety. At the final assessment, median anxiety scores for those who completed the program were significantly reduced by 80% and median depression scores were significantly reduced by 78% .

Summary: A study conducted by Hamilton West provides evidence of statistically and clinically significant improvement in anxiety and depression with SKY, as seen in 991 patients across the United Kingdom. For those who completed the SKY program, the median anxiety (GAD) scores reduced significantly by 30% post intervention, and the median depression (PHQ) scores reduced significantly by 22%. At the final assessment, the median anxiety scores were reduced by 80% and the median depression scores were reduced by 78%. This study supports offering SKY as a therapeutic option more widely, due to its potential cost benefit to treat mild-to-moderate depression and anxiety disorders.

3.8 SKY as an adjunct in Generalized Anxiety Disorder (GAD) with or without comorbidities

An open label study was conducted by Katzman et al.^[18] to study the effect of SKY on Generalized Anxiety Disorder (GAD). Forty one (41) adult participants (18-65 years) with a primary diagnosis of GAD, who had undergone a minimum of eight weeks of standard treatment in Toronto, were enrolled in the study. The SKY workshop was administered and the participants were encouraged to practice the SKY technique at home daily after the workshop. They were also offered a group practice session every week for two hours, led by certified SKY instructors. Psychological measures were obtained at baseline and at four weeks after completing the intervention. Thirty one (31) patients completed the program. Twenty nine (29) subjects completed the anxiety questionnaire (HAM-A). After 4 weeks of SKY program, the response rate was 73%. Response was defined as a decrease of $\geq 50\%$ on anxiety scores and was seen in 21 out of 29 subjects. The remission rate at 4 weeks post intervention assessment was noted to be 41%. Remission was defined as very low anxiety scores and achieved by 12 out of 29 subjects. The difference between pre and post intervention scores on the BAI scale (measuring severity of anxiety symptoms) also approached significance. Significant changes were also noted in the ASI, a self-report scale measuring the tendency to experience fear and anxiety-related symptoms, and PSWQ, an instrument that evaluates the trait of pathological worry by measuring generality, excessiveness and uncontrollability. Fear and anxiety were reduced after SKY. Significant decrease was noted in emotion-oriented coping. Emotion oriented coping is an effort by an individual to cope with emotions by behaviors such as self blame, blaming others, eating, expressing emotions etc and is

associated with poorer health outcomes. It's less effective than other methods of coping.

Summary: Katzman et al. studied the therapeutic effect of SKY in 41 individuals suffering from anxiety. After 4 weeks of SKY program, the response rate was noted to be 73%. Response was defined as a decrease of $\geq 50\%$ on anxiety scores and was achieved in 21 out of 29 subjects. A 41% remission rate (12 out of 29 subjects, defined as very low anxiety scores) was also noted after the SKY program. This is particularly relevant given the severity of treatment resistance in this population of GAD patients. These patients had failed to achieve remission despite previous treatments with CBT and/or Mindfulness Based Stress Reduction (MSBR). Of those who completed the study, 100% attended all five sessions. SKY is a potentially valuable adjunct to medication for patients with GAD and treatment-resistant GAD.

3.9 Anti-anxiety efficacy of Sudarshan Kriya Yoga in generalized anxiety disorder

Doria et al.^[19] studied the effect of Sudarshan Kriya Yoga on generalized anxiety disorder with or without comorbidities. A total of 69 outpatient adult patients, between 25 to 64 years of age, with a primary diagnosis of mood and/or anxiety disorder participated in the study. Out of 69, 39 patients suffered from Generalized Anxiety Disorder, 18 patients from depression and the remaining 12 patients were diagnosed with both dysthymic disorder and Generalized Anxiety Disorder. The sample was divided into two groups. Group 1 had undergone a minimum of six months of standard pharmacological treatment. Group 2 had undergone at least six months of participation in self-help groups but without any medication. Both groups were taught the SKY technique. SKY technique was delivered in an intense workshop format, consisting of 10 sessions taught over the course of two weeks, followed by weekly SKY classes for 6 months. Participants were assessed at baseline, at two weeks, at three months and at six months into the study. Scores on anxiety and depression scales in both the groups significantly dropped after the practice of the SKY technique. There was a 34.68% decrease in anxiety scores and a 36.2% decrease in depression scores after 6 months of SKY practice, in patients who took medicine. Whereas among the patients who didn't take medicine, a 51.02% decrease in anxiety scores and a 36.23% decrease in depression scores were observed. This effect was evident within 2 weeks of SKY and maintained up to 6 months.

Summary: Doria et al studied 69 outpatients diagnosed with mood/anxiety disorders. The study subjects were divided into two groups, one group had received pharmacological treatment in the past and the other had opted for complementary treatment without medication. Assessment of scores was carried out at baseline, and at two weeks, 3 months and 6 months of SKY practice for both study groups.

Overall, there was a 34.68% decrease in anxiety scores and a 36.2% decrease in depression scores after 6 months of SKY practice in patients who took medicine. Whereas among the patients who didn't take medicine, a 51.02% decrease in anxiety scores and a 36.23% decrease in depression scores were observed. SKY is an effective complementary therapy for patients with anxiety who are on medication. SKY is equally effective in people who are not keen on medication. Besides its beneficial impact on improving anxiety and depression, the advantages of SKY include being cost effective and devoid of side effects.

Research Summary Section 4 : Impact of SKY on mental well-being of HIV patients

Conditions like HIV and Cancer have a major impact not only on physical health, but also on mental health. Enhancing the quality of life among patients with HIV is a priority. The following section summarizes the impact of SKY on boosting the quality of life among HIV patients.

4.1 Evaluating quality of life among HIV patients who practice Sudarshan Kriya Yoga

A randomized control trial was conducted by Mawar et al.^[20] to evaluate the impact of SKY on the quality of life of 61 HIV positive adults. The study (SKY) group consisted of 31 subjects who received the SKY intervention in addition to the standard treatment. Control group consisted of 30 subjects who received only the standard treatment. Quality Of Life (QOL) scores, blood pressure values and CD4 count were comparable for both groups prior to the SKY intervention. QOL and biological parameters were assessed before the intervention, and at 4 weeks, 8 weeks and 12 weeks after the intervention. After 12 weeks of SKY practice, an overall improvement was seen in the QOL scores in the SKY group, as compared to the non-participating control group. An improvement of 12.5% in the physical domain of the QOL was noted after 12 week SKY practice. SKY is a low cost strategy which could be used by HIV patients to better their quality of life.

Summary: Results from a randomized control trial by Mawar et al. evaluating the impact of SKY on 61 patients with HIV, revealed that after the SKY intervention, an overall improvement in the QOL scores was noted in the SKY group, as compared to the control group. An improvement of 12.5% in the physical domain of the QOL was noted after 12 week SKY practice. SKY is a low cost strategy which could be used by HIV patients to better their quality of life

Research Summary Section 5 : Studies on mental well-being of people with substance use

Substance abuse is defined as the overindulgence of or dependence upon any addictive substances, especially alcohol or drugs. Substance abuse is both a risk factor and an outcome of poor mental health, and frequently coexists with mental health disorders. The following 2 studies explore the impact of SKY on mental health and wellbeing of those with addictive behaviors.

5.1 Sudarshan Kriya Yoga as an intervention to manage psychoactive substance use

A Randomized control trial by Sureka et al.^[21] assessed the impact of SKY on mental health and wellbeing of substance (drug) dependent individuals. Male patients from the de-addiction ward of the Central jail hospital New Delhi, who were suffering from substance dependence were enrolled in the study (n=111). Patients were allocated to either the non-SKY group (n=56) or to the SKY group (n= 55). The study assessed the mental health and wellbeing of the patients after 6 weeks of intervention. After six weeks of SKY practice, 7 patients recovered completely from mental disorder and became symptom free. Additionally, it was noted that most of the patients in the SKY group who had severe symptoms prior to the intervention, showed a reduction in their severity of mental illness. Their scores shifted from severe to mild-moderate, after practicing SKY. The number of patients who reported reduced symptoms of anxiety increased by 5 fold post SKY intervention. The positive wellbeing improved by 25.68% and the general health of patients improved by 25.97% post SKY. However, among the non-SKY group, there was no change in the mean scores for overall wellbeing. In other words, a significant improvement was noted among the SKY group in parameters of (Global assessment functioning) GAF, anxiety, positive wellbeing, general health and total psychological and general wellbeing, after 6 weeks of SKY practice.

Summary: Practicing SKY helps to improve physical and psychological wellbeing, and overall functioning of patients with substance dependency. A Randomized control trial by Sureka et al. assessed a total of 111 incarcerated males. The subjects recovering from substance abuse and affected by mental illness were provided SKY to evaluate its impact on mitigating psychological problems. Post SKY, a 5 fold increase was seen in the number of study participants experiencing reduced symptoms of anxiety. General health of patients improved by 25.97% and the positive wellbeing improved by 25.68% after SKY.

5.2 Effect of Sudarshan Kriya Yoga on Depression Among Alcohol Dependent Individuals.

A non-randomized control study, conducted by Rani[22], assessed the impact of SKY practice on depression amongst alcohol dependent individuals. 60 patients suffering from depression and alcoholism were enrolled in the study. The intervention (SKY) group and the control group included 30 patients each. The SKY group received SKY practice for 7 days. The control group did not receive any intervention. Data was collected at baseline, and on Day 7. Prior to the intervention, 30% of the subjects in the SKY group reported being moderately depressed, and 70% being severely depressed. However, post SKY, their scores improved and 66% of them scored for mild levels of depression and 44% for moderate levels of depression. None reported severe depression. In the control group, at baseline, 44% subjects reported moderate levels of depression and 66% reported severe levels of depression. However, after 7 days, the number of patients reporting moderate levels of depression increased to 70%, and 30% progressed to severe depression. Although there was some improvement in the control group, it was not as significant as the SKY group.

Summary: A study by Rani demonstrated the effect of SKY practice on alleviating depression amongst those with alcohol dependency. The results after 7 days of SKY showed a reduction in symptoms of depression. Before SKY practice, 30% in the group suffered from moderate depression, and 70% reported suffering from severe depression. However after the SKY intervention, 66% reported mild levels of depression, and 44% reported moderate levels of depression. None had severe depression.

Summary of Research Findings:

S.1 : Mental Health

- Deteriorating Mental health is a major concern in today's world. Mental health crisis has never been more at the forefront than at present.
- Mental health is a complex phenomenon. Studies on SKY have assessed multiple mental health parameters including stress, anxiety, depression, happiness, quality of life, resilience, and social connectedness, and more.

S.2 : Impact of SKY on Mental Health among general practitioners :

A total of 6 studies have been conducted to investigate the impact of Sudarshan Kriya Yoga on the mental health of the general population. First 2 studies assess the benefit of SKY during the COVID pandemic. The third study is a cross sectional study on experienced practitioners. The last 3 studies are pre and post studies that investigate the impact of SKY immediately as well as at 6 weeks of SKY practice.

- Parimala and Kanchibhotla, evaluated 956 people using self-reported mental health and anxiety measures in the early part of the pandemic. A reduced negative impact of the pandemic on the mental health of SKY practitioners was observed (almost half), compared to the general population and non-SKY practitioners. This strengthens the evidence that yogic methods, especially SKY practice, are highly effective in maintaining mental well-being, even during difficult situations and hardship.
- A study by Kanchibhotla et al. including 92 HCPs showed that after 40 days of the SKY practice, HCPs working on the frontlines during the COVID 19 pandemic reported a 36.84% decrease in stress, 27.39% decrease in anxiety and 46.75% decrease in depression, suggesting that SKY practice had a positive influence on them. This is very significant as the data collection for this study took place when India was in a state of lockdown. Not only was there a great anxiety among the people, effective therapeutic options for COVID-19 were also not available. At such a time, HCPs were under tremendous pressure. Despite being in such an extraordinarily

dire situation, SKY created a sense of positive mental well-being in them. The HCPs reported improved sleep and resilience, as well as greater satisfaction with life after the practice of SKY.

- SKY alleviates stress in the general population more effectively compared to other stress relieving measures. A cohort study by Patil et al., compared SKY and other stress releasing measures among 100 SKY practitioners and 100 age matched controls. SKY had a positive effect on physical and mental health of its practitioners. People who practiced SKY showed higher levels of happiness by 3.43 times, better concentration by 2.33 times, and deeper sleep quality by 3.9 times. SKY is a low risk, low cost option to mitigate stress and its adverse effects on the human body.
- The impact of SKY on the well being of 103 healthy adults was studied by Kjellgren et al. at baseline and after 6 weeks of practice. SKY intervention was compared with a 15 minutes self meditation practice and it was shown that SKY practice has a significant effect on reducing depression, anxiety and symptoms of stress, even among healthy individuals. The parameters were measured before the intervention, and after 6 weeks of SKY practice. A reduction of 33.57%, 17.7%, 22.76% was noticed in the outcomes of depression, anxiety and stress respectively after six weeks of SKY practice. SKY was also found to increase optimism in one's life.
- Humans are social beings and require healthy, close personal and social relationships to experience good mental health. 473 participants who enrolled in SKY workshop were recruited for a study conducted by Kanchibhotla et al. The participants were assessed at three different time points; day 0, day 4 (immediately after the workshop) and at day 40 after the workshop. The authors found a 40% improvement in social connectedness and a 24.5% reduction in stress after 40 days of SKY practice. The higher the frequency of SKY practice, the greater was the impact on improving social connectedness. Yogic practices like SKY can be an effective tool for overcoming loneliness and reducing stress.
- The last few decades have seen an increasing use of smartphones, and mushrooming of multiple social media platforms. This has led to a growing Internet dependency, which in turn has affected the quality of life and social connectedness among users. 497 SKY practitioners who had participated in at-least one SKY follow-up session within the past 6-weeks, and 272 non-SKY practitioners were compared for internet dependency and social connectedness. The study revealed that SKY practitioners are less addicted to the internet and have higher social connectedness. The level of internet dependency was found to be 12.68 higher among the non-SKY group than the SKY group. Internet dependency is correlated with lower social connectedness, as observed in the scores on the social connectedness scale (SCS). Non-SKY group had lower

SCS scores. This highlights the importance of SKY in protecting against behavioral addictions and promoting a wholesome quality of life.

S.3 : Impact of SKY on Post traumatic stress disorder.

Four studies (2 RCTs, one feasibility study and one non randomized control study) have explored the impact of SKY on PTSD among veterans and survivors of natural disasters.

- A randomized waitlist control study by Carter et al. on 25 male veterans was conducted to assess the efficacy of SKY in reducing PTSD severity amongst Vietnam veterans. Results demonstrated a 25.2% decrease in PTSD symptoms after 6 weeks of SKY practice and a further decline from baseline by 37.76% after 6 months. Meanwhile, veterans in the control group, who didn't receive SKY, showed no change in their scores on the PTSD CAPS scale after 6 weeks. This emphasizes the effectiveness of SKY practice in reducing symptoms of PTSD.
- A randomized control trial by Seppala et al. including 21 U.S. male veterans of the Iraq or Afghanistan war with PTSD symptoms, demonstrated that the PTSD scores and anxiety symptoms reduced with the practice of SKY. Significant difference was noted within 1 week of the intervention. Results showed that the PTSD scores reduced by 28.86% in a week and reduced further after one year of practice (by 30.07%).
- Vasudev et al. evaluated the impact of SKY technique on 19 individuals suffering from PTSD symptoms, demonstrating that the practice of SKY led to significant improvements in the symptoms of PTSD, as well as in associated depression and anxiety. Data was obtained before the SKY intervention, and after 12 weeks and 24 weeks of SKY practice. There was a clinically significant improvement (decrease by 23.9%) in PTSD symptom scores at week 12 of SKY practice, compared to baseline scores. Symptoms of depression and anxiety also decreased, by 23.7% and 11.9% respectively, after the SKY intervention. The symptoms further reduced at the 24 week assessment, even though the formal intervention support ceased after week 12. This highlights the sustainability and long term efficacy of SKY practice.

- A non-randomized study by Descilo et al. evaluated the effect of a yoga breath program, including Sudarshan Kriya, on alleviating the symptoms of PTSD and depression among 183 survivors of the 2004 Asian tsunami. Assessments were conducted at baseline just before starting the program; and at 6, 12 and 24 weeks. The results showed that Yoga breath-based SKY and trauma reduction exposure techniques may be effective in providing rapid and sustained relief for PTSD and depression symptoms in the survivors of a mass disaster. The intervention group recorded a 60% reduction in the PTSD scores and a 90% reduction in the depression scores. However, the control group had a very small change in scores during the study duration of 24 weeks.

S.4 : Impact of SKY on Anxiety and Depression

The impact of SKY on depression and anxiety has been an important area of interest. Multiple forms of depression have been studied. A total of 9 studies (6 on depression, 2 on Generalised Anxiety Disorder and one on both) investigate the impact of SKY on individuals who experience depression and anxiety.

- A randomized control trial conducted by Sharma et al. at the University of Pennsylvania studied the impact of SKY on 25 outpatients suffering from Major Depressive Disorder. The study included patients who were suffering from depression and were unresponsive after >8 weeks of therapy in an outpatient setting. The results showed a 52.5% decrease in depression scores as measured by HRSD and a 62.3% reduction in depression scores with 8 week practice of SKY as measured by BDI. More than half (54%) the population in the SKY group showed a greater than 50% improvement in their symptoms. This is significant as these patients had not responded to antidepressant medication for >8 weeks previously. This demonstrates the effectiveness of SKY as an adjunct therapy for patients with major depression who have not responded to antidepressants.
- Janakiramaiah et. al. studied the antidepressant effects of SKY in 45 patients with melancholic depression, along with the remission post SKY treatment. SKY produced a 67% remission rate in patients with depression and stability of the response was shown post 4 weeks of practice. The benefits of SKY were comparable to the standard antidepressant medication. SKY can be a potential alternative to drugs as a first line treatment for melancholia. SKY is better tolerated than electroconvulsive therapy or shock treatment. The side effects due to medication can be avoided as well. The

fact that antidepressant effect was demonstrated in hospitalized patients shows that the response to SKY is not just a placebo effect.

- Murthy et al. studied the efficacy of SKY amongst 24 dysthymic patients. The study compared the depression scores and P300 ERP amplitude readings of patients with depression with healthy controls. At baseline, the readings of patients with depression were found to be lower in amplitude and abnormal, compared to healthy controls. The patients suffering from depression were provided SKY and the readings were recorded again after 90 days of SKY practice. At the 90 day assessment, the EEG pattern in patients with depression who practiced SKY was similar to that of healthy individuals, indicating the effectiveness of SKY practice in treating depression.
- A study by Murthy et al. assessed the antidepressant effects of SKY on 30 patients suffering with depression. The assessment was done at baseline, after 1 month and 3 months post SKY. The study demonstrated a significant drop in depression scores by 72.05% and 63.6%, as measured by two different scales. The results were observed within 3 weeks of SKY intervention which is quicker than the usual antidepressant medication.
- SKY can be effective as the sole treatment for dysthymic disorder. A study by Shetty et al. enrolled 46 patients with dysthymic disorder. The assessments were done at pretreatment, 1 month post SKY and 3 months post SKY. Regular practice of SKY helps in remission, as shown in 68% of the study population at 3 months. A 64% drop in the anxiety scores and 68.5% drop in the depression scores was recorded at 3 months. SKY has the advantage of making the patients self reliant and reducing health care costs.
- Vangala et al. compared the efficacy of short and long SKY among 30 individuals suffering from depression. The assessments done at baseline and at 4 weeks revealed that both short and long SKY are equipotent in their antidepressant and antianxiety effects in major depressive disorder. Individuals showed as much as 50% reduction in depression in only 4 weeks. This demonstrates the importance of home practice of SKY (short SKY).
- A study conducted by Hamilton West provides evidence of statistically and clinically significant improvement in anxiety and depression with SKY, as seen in 991 patients across the United Kingdom. For those who completed the SKY program, the median anxiety (GAD) scores reduced significantly by 30% post intervention, and the median depression (PHQ) scores reduced significantly by 22%. At the final assessment, the median anxiety scores were reduced by 80% and the median depression

scores were reduced by 78%. This study supports offering SKY as a therapeutic option more widely, due to its potential cost benefit to treat mild-to-moderate depression and anxiety disorders.

- Katzman et al. studied the therapeutic effect of SKY in 41 individuals suffering from anxiety. After 4 weeks of SKY program, the response rate was noted to be 73%. Response was defined as a decrease of $\geq 50\%$ on anxiety scores and was achieved in 21 out of 29 subjects. A 41% remission rate (12 out of 29 subjects, defined as very low anxiety scores) was also noted after the SKY program. This is particularly relevant given the severity of treatment resistance in this population of GAD patients. These patients had failed to achieve remission despite previous treatments with CBT and/or Mindfulness Based Stress Reduction (MSBR). Of those who completed the study, 100% attended all five sessions. SKY is a potentially valuable adjunct to medication for patients with GAD and treatment-resistant GAD.
- Doria et al studied 69 outpatients diagnosed with mood/anxiety disorders. The study subjects were divided into two groups, one group had received pharmacological treatment in the past and the other had opted for complementary treatment without medication. Assessment of scores was carried out at baseline, and at two weeks, 3 months and 6 months of SKY practice for both study groups. Overall, there was a 34.68% decrease in anxiety scores and a 36.2% decrease in depression scores after 6 months of SKY practice in patients who took medicine. Whereas among the patients who didn't take medicine, a 51.02% decrease in anxiety scores and a 36.23% decrease in depression scores were observed. SKY is an effective complementary therapy for patients with anxiety who are on medication. SKY is equally effective in people who are not keen on medication. Besides its beneficial impact on improving anxiety and depression, the advantages of SKY include being cost effective and devoid of side effects.

S.5 : Impact of SKY on mental well-being of HIV patients

Conditions like HIV and Cancer have a major impact not only on physical health, but also on mental health. Enhancing the quality of life among patients with HIV is a priority. The following section summarizes the impact of SKY on boosting the quality of life among HIV patients.

- Results from a randomized control trial by Mawar et al. evaluating the impact of SKY on 61 patients with HIV revealed that after the SKY intervention, an overall improvement in the QOL scores was noted in the SKY group, as compared to the control group. An improvement of 12.5% in the physical domain of the QOL was noted in the SKY group after 12 week SKY prac-

tice. SKY is a low cost strategy which could be used by HIV patients to better their quality of life.

S.6 : Impact of SKY on mental well-being of people with substance use

Substance abuse is defined as the overindulgence of or dependence upon any addictive substances, especially alcohol or drugs. Substance abuse is both a risk factor and an outcome of poor mental health, and frequently coexists with mental health disorders. The following 2 studies explore the impact of SKY on mental health and wellbeing of those with addictive behaviors.

- Practicing SKY helps to improve physical and psychological wellbeing and overall functioning of patients with substance dependency. A Randomized control trial by Sureka et al. assessed a total of 111 incarcerated males. The subjects recovering from substance abuse and affected by mental illness were provided SKY to evaluate its impact on mitigating psychological problems. Post SKY, a 5 fold increase was seen in the number of study participants experiencing reduced symptoms of anxiety. General health of patients improved by 26% and the positive wellbeing improved by 26.26% after SKY.
- A study by Rani demonstrated at the effect of SKY practice on alleviating depression amongst those with alcohol dependency. The results after 7 days of SKY showed a reduction in symptoms of depression. Before SKY practice, 30% in the group suffered from moderate depression, and 70% reported suffering from severe depression. However after the SKY intervention, 66% reported mild levels of depression, and 44% reported moderate levels of depression. None had severe depression.

Conclusion

Mental Health is a subject of a great importance in today's world. Most people have experienced a mental health issue at some point in their lives. Depression, stress and anxiety are some of the common mental health concerns prevalent worldwide. Increased inherent episodes of these negative mental maladies can be detrimental to health as well as generate personality associated issues if they remain unattended. Mental health is a continuum like physical health, and like physical health, it also requires attention. For several decades, the sole focus of mental health research was around mitigation of mental health disorders like depression and anxiety. However, in the recent decades there has been an increased focus on positive mental health and how to enhance it.

Multiple studies have validated the beneficial impact of SKY on both physiological and psychological parameters in a multi-layered manner. Results from various studies illustrate that SKY aids recovery from depression and anxiety in different populations. These studies indicate that SKY is an effective therapy for treatment of mental disorders and regular practice of SKY can help prevent contracting stress related mental disorders. Not only does SKY help overcome negative mental health, it also helps develop and enhance qualities associated with positive mental health like resilience, happiness, satisfaction with life. Through various research studies, Sudarshan Kriya Yoga has been shown to hold considerable potential to alleviate the mental health ailments and promote good mental health, and can be considered as a lifestyle change for various population groups.

About Sri Sri Institute for Advanced Research

Sri Sri Institute for Advanced Research (SSIAR) is the research wing of The Art of Living, founded under Ved Vignan Maha Vidya Peeth (VVMVP) Trust. SSIAR's mission is to apply the science of Global Ancient Knowledge Systems to solve the challenges facing the world today. Its vision is to become an internationally renowned center of excellence for scientific enquiry into Global Ancient Knowledge Systems.

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