



SRI SRI INSTITUTE FOR ADVANCED RESEARCH

*Art of Living Research Wing*

*A White Paper Series on Sudarshan Kriya Yoga*

## **A White Paper on Sudarshan Kriya Yoga and DM**

### **Introduction**

Diabetes Mellitus (DM) is a chronic metabolic disorder of the carbohydrate (sugar) metabolism that impairs the conversion of food (sugars) into energy. The disorder is named after greek word “diabainein” meaning *passing through* and latin word “mellitus” meaning *sweet*. DM is one of the major contributors to many illnesses including cardiac arrest and stroke. According to the WHO, the global prevalence of DM in adults over 18 years of age rose from 4.7% in 1980 to 8.5% in 2014. Type 2 DM accounts for almost 90% of all DM cases.

Reduced production or resistance of the hormone-insulin, one of the important factors of carbohydrate metabolism, is the major cause of DM. This impairment prevents the body cells from taking up the blood sugar and converting it to energy, thereby causing excess of sugar in the blood. The insufficient production of insulin hormone, due to an attack of the immune system on beta cells of pancreas, causes type 1 DM while the defective insulin that does not allow blood glucose to be taken readily (insulin resistance) to break down into energy and less production of insulin both causes type 2 DM. The common body cells that are stimulated by insulin are adipose cells, liver cells and muscles.

Hyperglycemia or chronic DM cause several complications damaging the nerves and blood vessels. The damage in the vessels can cause several complications in the heart, brain, eye, nerves and kidney causing heart attack, stroke, retinopathy, neuropathy and nephropathy. The higher amounts of glucose (usual sugar found in the blood) accumulated in the blood is often excreted by the body through urine. However, due to high glucose content more water is excreted causing increased frequency and volume of urine also known as polyuria. Other complications of DM include unexplained weight loss, increased hunger, fatigue, and intractable

wounds that are hard to heal. Over the past few decades, research has established that lifestyle changes, including physical activity, mental relaxation, and mind-body interventions have a role to play in preventing or treating chronic metabolic disorders such as type 2 DM.

### ***Pathophysiology of Type 2 DM***

Pathophysiology of type 2 DM is very complex including various known and unknown factors. While genetic disposition and epidemiology play a major role in the etiology of type 2 DM, nutritional factors, high caloric diet causing obesity and stress are the major culprits of the disorder. Beta cells of the pancreas, producers of the insulin hormone are stimulated to produce insulin under high glucose levels in the body. However, due to the insulin resistance, caused by defective insulin, the glucose levels remain high. This further stimulates the beta cells to produce more insulin to reduce the glucose levels. Over a period of time, the activity of beta cells are reduced thereby gradually decreasing the insulin production. The decrease in insulin production prevents the body cells to take up the blood glucose efficiently and convert it into energy.

### ***Predisposing Factors for Type 2 DM***

While type 1 DM is mostly genetic in nature, type 2 DM is a lifestyle disorder and can be mostly managed. The below section encounters few lifestyle conditions commonly faced by individuals that can act as a predisposing factor for type 2 DM. Correcting these factors can prevent the occurrence and chance of type 2 DM.

#### ***Stress***

Stress is a common predisposing factor for type 2 DM, causing hyperglycemia. Under stress, stress hormones cortisol and adrenaline are released to prepare the body for fight or flight response or the sympathetic nervous system. As a part of the fight or flight response the blood sugar levels are increased but insulin production is suppressed. Over time due to chronic stress, increased cortisol levels reduce the functioning of beta cells of pancreas causing lower insulin production or cause insulin resistance in the body. Continuous insulin resistance also caused due to stress, wears out the beta cells capacity to produce enough insulin to counter blood glucose levels ultimately leading to hyperglycemia. This leads to prediabetic condition. This phenomenon carried out for a long time causes type 2 DM.

### ***Sedentary Lifestyle and Diet***

Sedentary lifestyle with attributes of poor sleep, lack of exercise and processed diet causes various lifestyle disorders like poor heart health, hypertension and DM. During exercise and moderate physical activity, the muscles utilize blood glucose efficiently. Regular physical activity allows insulin to work properly and reduce the chance of insulin resistance and type 2 DM. Another hallmark of the modern lifestyle is highly processed rich carbohydrate diets that are digested quickly by the body causing the blood glucose to spike progressively. This increase in blood glucose frequently causes extra stress on the pancreas to produce higher amounts of insulin leading to reduced insulin production over a period of time as well insulin resistance - both leading to DM.

### ***Excess body fat and Obesity***

Weight is a prominent risk factor for type 2 DM. Accumulation of abdominal fat around visceral organs like the liver and other muscle cells make it difficult for the insulin to work efficiently and allow blood glucose to enter the body cells causing insulin resistance.

### ***Reactive oxygen species***

High oxidative stress has been recently identified as a cause of insulin resistance that leads to type 2 DM. Reactive oxygen species are known to modulate several signaling pathways and damage the cells. These modulations of the signaling pathway create end products that hamper the intake of glucose into the cell causing more insulin to be produced wearing out beta cells.

### ***Inflammation***

Several factors cause inflammation in the body. The proinflammatory signals and mediators produced by the liver and adipose tissues promote insulin resistances and elevates the blood glucose in the body. The inflammatory state can slow the breakdown of free radicals in the fat tissues, thereby again increasing the blood glucose in the body.

### ***Diagnosis***

DM is most commonly monitored by testing the fasting blood glucose (sugar) levels and post prandial blood glucose levels. Fasting blood glucose tests indicate the ability of the body to regulate the blood sugar levels in absence of food. When there is no external source of energy,

the body releases glucose into the blood to be used by cells. Normally, this process is stabilized by insulin, which maintains the fasting blood sugar level between 70-100 mg/dl for a normal healthy adult. Postprandial (PP) blood glucose test measures the glucose level after a meal. PP test measures the ability of the insulin to utilize the glucose in the blood and store its normal range as energy. Range of PP blood glucose levels in a healthy individual is 140-160 mg/dl. Another method of diagnosing type 2 DM includes the Haemoglobin A1C test (HbA1c). This test measures the average glucose levels in the blood on an average of three-four months. This is because glucose sticks to the hemoglobin in the red blood cells that spans for three to four months. The normal HbA1c value for a healthy individual is below 5.7%.

### ***Sudarshan Kriya Yoga (SKY)***

Sudarshan Kriya Yoga is a technique taught by the Art of Living Foundation in more than 180 countries with more than 6 million practitioners across the globe. It is taught in various modules across various age groups in different 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 under 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.

### ***Research studies on Sudarshan Kriya Yoga and Diabetes mellitus***

Due to its epidemiology and high prevalence, type 2 DM is one of the most researched topics in the medical field. Various mind-body interventional therapies including Sudarshan Kriya Yoga have been studied for their impact on type 2 DM. Short summaries of research studies that evaluate the benefit of SKY on type 2 DM are presented below.

### **1. Sudarshan Kriya Yoga creates immediate improvements in blood glucose and lipid profile in Type 2 Diabetes mellitus patients**

An abnormal lipid profile is a significant comorbidity for patients with type 2 DM. It contributes to premature hardening and blockage of arteries, and developing complications such as heart and kidney disease. Elevated triglyceride and LDL, and decreased HDL (good) cholesterol concentrations are commonly seen in Type 2 DM patients. Anupama et al.<sup>[1]</sup> studied the effect of SKY on patients with Type 2 DM. 40 subjects with type 2 DM- 20 men and 20 women between the ages 40-60 were enrolled in the study. Blood sugar levels and lipid profile were measured before and after 6 days of Sudarshan Kriya Yoga training. The beneficial changes included a significant drop in fasting blood sugar by 35%, total cholesterol by 19.7%, triglyceride levels by 24.9% and rise in HDL (good) cholesterol by 36.9% after SKY. This indicates that SKY can be a very useful adjunct to oral hypoglycemic agents as a therapeutic agent for type 2 DM. SKY provides a holistic approach to improving glycemic control and normalizing lipid profile in diabetic patients.

**Summary:** A study revealed that SKY practice had an immediate effect on reducing fasting blood glucose (significant drop of 35%) in patients with type 2 DM. Cholesterol level also reduced by 19.7% while HDL (good) cholesterol increased by 36.9% after 6 days of SKY practice. Regular practice of SKY technique can help create a healthier blood sugar level and lipid profile in Type 2 diabetic patients, which in turn leads to a reduced risk of heart disease, stroke, kidney disease and eyesight complications.

### **2. Long term benefits of SKY in treatment of type 2 Diabetes mellitus**

Agte and Tarwadi.<sup>[2]</sup> investigated the effect of SKY on Type 2 DM. A total of 87 patients with type 2 DM between the ages 45–65 participated in the study. Each subject had previously been diagnosed with type 2 DM, had stable glucose levels, and was taking prescribed medication.

The subjects were divided into treatment and non-treatment groups, with 57 in the treatment group (SKY) and 30 in the non-treatment group (non SKY). Fasting and postprandial glucose levels, lipid profile, and glycosylated hemoglobin (HBA1c) were measured before SKY practice, and again after 4 months of SKY practice. After 4 months, the fasting glucose was significantly lowered, by 17.36% and HBA1c by 4.64%, in the treatment group that had been practicing SKY. A 16.3% drop in triglycerides and 14.6% reduction in cholesterol levels was also observed in the treatment group after 4 months of SKY practice. It was interesting to note that subjects with higher disparities (more abnormal markers at baseline) had higher magnitudes of reduction with SKY practice than subjects with marginally high levels (lesser abnormal values at baseline) of these markers. This suggests that SKY may act as a corrective strategy and its impact is correlated with the severity of imbalance.

**Summary:** In a study evaluating the impact of SKY on individuals with type 2 DM, the treatment group experienced a significant reduction in the fasting blood sugar level (17.36%), HBA1c (4.64%) and cholesterol (14.6%), along with improvement in lipid profile (16.3%) after 4 months of SKY practice. This study demonstrated the benefits of SKY on management of type 2 DM through improving fasting blood sugar and lipid profile in patients with type 2 DM. It was interesting to note that subjects with higher disparities had higher magnitudes of reduction with SKY practice than subjects with only marginally high levels of these markers.

### **3. Sudarshan Kriya Yoga and improved quality of life in patients with type 2 Diabetes Mellitus**

Jyotsna et al.<sup>[3]</sup> studied the impact of SKY on the quality of life among 49 patients with type 2 DM. Patients were placed on anti-diabetic medication for the initial 6 months. At 6 months, they were randomized into two groups: SKY group and non-SKY group. A total of 27 patients were randomized to the SKY group and 22 patients to the non-SKY group. The SKY group learned and practiced the SKY technique in addition to receiving the standard treatment for type 2 DM. The non-SKY group received only the standard treatment for type 2 DM. The study outcomes included fasting and postprandial plasma glucose, HBA1c and quality of life (QOL) questionnaires in both groups at baseline (pre SKY) and after 3 months of practice. The authors noted a trend toward improvement in glycemic control and quality of life in the SKY group. The

SKY group reported a drop in blood glucose level after 3 months of SKY practice, while the control group showed a slight increase in the fasting blood glucose level and post-prandial blood glucose level during the same period. There was also a decrease of 0.026% in the mean HBA1c in the SKY group whereas in the non-SKY group, there was an increase of 0.03%. At 3 months, there was a significant improvement in QOL in the group practicing Sudarshan Kriya Yoga as compared to with the control group. The mean Quality of life score increased by 9% after 9 months in the SKY group but no significant change was noted in the control group.

**Summary:** In a study that included 49 patients with type 2 DM, those practicing SKY had a significant improvement in the control of type 2 DM as demonstrated by the blood glucose levels measurements over the course of 9 months of the study. SKY had a significant effect on improving the quality of life as well. Together these effects indicate that SKY can strongly support better management of DM and contribute to a healthier and happier life for diabetic practitioners.

#### **4. Long-term efficacy of Sudarshan Kriya Yoga in management of type 2 Diabetes mellitus**

Previous studies suggest that SKY may be useful in achieving glycemic control in patients with type 2 DM. The role of SKY in type 2 DM was studied by Jyotsna et al.<sup>[4]</sup> A total of 120 patients with type 2 DM on oral medication, diet and exercise recommendations, were randomized into two groups: the first group continued to receive the standard treatment for type 2 DM; the second group was taught SKY and monitored, so that they regularly practiced SKY in addition to receiving the standard treatment for type 2 DM. At 6 months, the quality of life scores increased significantly in those practicing SKY and improvement in postprandial plasma glucose by 4 units while postprandial plasma glucose increased in the standard group by 14 units compared to baseline. Sympathetic cardiac autonomic functions were also significantly improved in the group practicing SKY.

**Summary:** A study on the benefits of SKY in patients with type 2 DM showed a significant improvement in blood glucose after 6 months of SKY practice. At 6 months, the quality of life scores increased significantly in those practicing SKY and improvement in postprandial plasma glucose by 4 units while postprandial plasma glucose increased in the standard group by 14 units compared to baseline. SKY could provide a non-invasive, low cost and easy to integrate adjunct therapy to manage DM. Since DM is also a major threat to cardiac illness, management of type 2 DM through SKY reduces the risk of cardiac disorders among diabetic individuals.



## **5. Sudarshan Kriya Yoga modulates cardiac autonomic functions in patients with type 2**

Diabetes mellitus

Type 2 DM is a risk factor for sudden cardiac death. One of the most overlooked of all serious complications of type 2 DM, is cardiac autonomic neuropathy which includes damage to the autonomic nerve fibers that innervate the heart, resulting in abnormalities in heart rate control. Cardiac autonomic neuropathy can lead to sudden cardiac death. The role of SKY in preventing progression of cardiac autonomic neuropathy was studied by Jyotsna et al.<sup>[5]</sup> Sixty Four (64) diabetic patients were randomized into two groups, one group received standard therapy for DM (n=36) and the other group received standard therapy for type 2 DM along with SKY (n=28). Standard therapy included dietary advice, brisk walking for 45 min a day, and administration of oral anti-diabetic drugs. Cardiac autonomic function was tested before and after 6 months of regular SKY practice. 24 of the 28 subjects in the SKY group, and 17 of the 36 subjects in the standard therapy group underwent the test for sympathetic cardiac function. Results showed that at baseline 18 participants among the SKY group had abnormal cardiac autonomic function, but after the SKY intervention, this number dropped to 12 people. This change was significant. In the standard therapy group, there was no change in the percentage of people with abnormal cardiac autonomic function. There was no significant difference in blood glucose measurements between the SKY and control group. Also, the mean HBA1c values decreased in the SKY group by 2.3% while increased in the standard therapy group by 5.7%. The authors concluded that cardiac autonomic function improved more significantly in patients who practiced SKY in addition to the standard treatment, compared to patients who followed the standard therapy alone. The study indicates that, if added to lifestyle, SKY program has the potential of preventing sudden cardiac death by improving the cardiac autonomic function.

**Summary:** Cardiac autonomic function improved in patients with type 2 DM who practiced SKY for 6 months in addition to receiving standard of care, compared to patients who were on standard therapy alone. SKY has a cardioprotective effect in patients with type 2 DM, thus preventing sudden death due to heart disease.



## 6. SKY and Management Of type 2 Diabetes mellitus: a non randomized control trial

Type 2 DM has emerged as a major health concern in India. Dasappa et al.<sup>[6]</sup> studied the role of SKY in the management of type 2 DM. One of the major challenges in the management of type 2 DM is adherence to self-care behavior. The role of SKY in promoting adherence to self-care behavior was assessed in this study. This interventional study was conducted across 4 slums (settlements of economically disadvantaged people) in the city of Bengaluru, India. A baseline survey was conducted before the study. Everyone above the age of 35 years was screened for type 2 DM. The prevalence of type 2 DM in the target population was found to be 12.33% which is higher than the usual prevalence of 8.4% in India. 109 people diagnosed with type 2 DM agreed to participate in the study. Everyone was started on medication. Of the 109 people, 52 agreed to participate in the intervention (agreed to learn and practice SKY), while the remaining 57 people were assigned to the non intervention group. The intervention group learned SKY and practiced it daily for 40 days. The outcomes were tested and compared with the baseline values after 40 days of SKY practice. The primary outcome measured was HbA1c, and secondary outcomes measured were SBP, DBP, adherence to medication, and changes in lifestyle. In this study, mean SBP decreased by 9.3%, and DBP by 10.1% among the SKY group after 40 days of practice. This was a statistically significant improvement. In the non-intervention group, SBP decreased by 4% and DBP by 3.1%. Mean HBA1c decreased by 12.7% in the intervention group, however, decreased by only 5.6% in the control group. The change of HBA1c in the intervention group was statistically significant. Random blood sugar level was reduced by 40% after 40 days of SKY in the intervention group. The drop for random blood sugar levels in the control group was only 14%. There was a stronger adherence to dietary changes among the SKY group as compared to the non-intervention group. Adherence to self care measures in the long-term is key to minimizing the morbidity of NCDs. SKY can be an effective tool in management of type 2 DM in a highly susceptible population by creating positive changes in serum glucose and blood pressure, and strengthening adherence to treatment.

**Summary:** The study measured the prevalence of type 2 DM in 4 slum areas in the city of Bengaluru, India, and found it to be higher than the prevalence among average Indian adults. SKY was provided as an intervention to those who were diagnosed with type 2 DM. After 40 days of SKY practice, the random blood sugar was reduced by 40% among SKY practitioners.

The HB A1c also reduced by 12.7% in the intervention group, which was a far greater decrease than in the control group. Similarly, the systolic blood pressure was reduced by 9.3%, and diastolic by 10.1%, among the SKY group. The SKY program was effective in improving dietary practices and medication adherence among diabetics, and helped to bring type 2 DM and hypertension under control for a higher proportion of individuals with DM.

## **7. Effect Of Sudarshan Kriya Yoga On Anxiety, Depression, And Quality Of Life In People With Type 2 Diabetes mellitus**

Type 2 DM is a challenging disease which requires immense self discipline for good glycemic control. There is enough evidence that depression and anxiety are relatively higher in people with type 2 DM than in the general population. At least 15% of patients with type 2 DM have clinical depression and poor mental health is associated with worse glycemic control and associated health problems. Living with DM is often a challenge to patients since it disturbs the physical and mental health of the patient. Shiju et al.<sup>[7]</sup> studied the effect of SKY in this unique population in Kuwait. 26 patients (30 years and above) diagnosed with type 2 DM for longer than 1 year and with mild to severe anxiety, were enrolled for the study. SKY intervention was provided to the enrolled participants for five days and they were instructed to continue home practice for 15 weeks. Pre and post 5-day SKY intervention, responses of participants on psychosocial concerns were evaluated using four questionnaires (Hamilton anxiety, Patient health questionnaire (PHQ-9), Hospital anxiety depression and WHO total quality of life (QOL). Biochemical parameters; such as lipid profile, HBA1c were measured at baseline and after 15 weeks of SKY practice. The study results indicated significant improvements in total quality of life score [increase from 57 to 65] among the SKY practicing group in comparison with the control group. Similarly, a significant reduction of 44% was noted for the mean anxiety score post SKY intervention. A significant decrease of 33% in the depression score post SKY intervention was observed. Participants expressed that they had a very sound and satisfying sleep after a long time with the very first practice of SKY. After SKY intervention glycemic control and lipid profiles did not improve significantly - maybe due to poor compliance at home.

**Summary:** This pilot study done in Kuwait shows significant improvement in anxiety, depression, quality of life and insomnia amongst diabetic patients after SKY intervention. A significant reduction of 44% was noted for the mean anxiety score, and a significant decrease of 33% was noted in the depression score post SKY intervention. SKY may be a potential

lifestyle modification for the management of the psychosocial problems associated with type 2 DM.

### 8. Effect of a Sudarshan Kriya Yoga program on type 2 Diabetes mellitus patients

Yoga and pranayama have proved benefits in improving non-communicable metabolic disorders such as type 2 DM. Verma et al.<sup>[8]</sup> studied the benefits of a comprehensive yogic module that included Sudarshan Kriya Yoga on type 2 DM patients. The study consisted of 137 participants, of which 84 were diagnosed with type 2 DM while the other 53 were non-diabetic individuals. All the participants, irrespective of their illness, received the same intervention. Random blood sugar, systolic and diastolic blood pressure and other vita parameters were measured at baseline and after seven days of the program period. The results demonstrated a significant percentage decline of 22% in blood sugar level among the individuals with type 2 DM and 12.5% decline among non-diabetic individuals. Therefore, the study showed that a seven day SKY module can significantly lower the blood glucose level even among the type 2 DM patients, providing an alternate adjuvant treatment.

**Summary:** A study on a comprehensive yoga module on type 2 DM and non-diabetic patients demonstrated that a seven day SKY workshop can reduce the blood glucose level by 22% even among type 2 diabetic individuals providing an alternate therapy for patients with type 2 DM.

### **SUMMARY**

1. Type 2 DM is one of the major non communicable diseases prevalent in the world today. It is a metabolic disorder of the carbohydrate (sugar) metabolism that impairs the conversion of food (sugars) into energy. Major predisposing factors for type 2 DM include stress, sedentary lifestyle, diet, excess body fat and inflammation, all regulating the insulin hormone responsible for maintaining the blood glucose levels.

2. A study revealed that SKY practice had an immediate effect on reducing fasting blood glucose (significant drop of 35%) in patients with type 2 DM. Cholesterol level also reduced by 19.7% while HDL (good) cholesterol increased by 36.9% after 6 days of SKY practice. Regular practice of SKY technique can help create a healthier blood sugar level and lipid profile in Type 2 diabetic patients, which in turn leads to a reduced risk of heart disease, stroke, kidney disease and eyesight complications.

3. In a study evaluating the impact of SKY on individuals with type 2 DM, the treatment group experienced a significant reduction in the fasting blood sugar level (17.36%), HBA1c (4.64%) and cholesterol (14.6%), along with improvement in lipid profile (16.3%) after 4 months of SKY practice. This study demonstrated the benefits of SKY on management of type 2 DM through improving fasting blood sugar and lipid profile in diabetic patients with type 2 DM. It was interesting to note that subjects with higher disparities had higher magnitudes of reduction with SKY practice than subjects with only marginally high levels of these markers.

4. In a study that included 49 patients with type 2 DM, those practicing SKY had a significant improvement in the control of type 2 DM as demonstrated by the blood glucose levels measurements over the course of 9 months of the study. SKY had a significant effect on improving the quality of life as well. Together these effects indicate that SKY can strongly support better management of DM and contribute to a healthier and happier life for diabetic practitioners.

5. A study on the benefits of SKY in patients with type 2 DM showed a significant improvement in blood glucose after 6 months of SKY practice. At 6 months, the quality of life scores increased significantly in those practicing SKY and improvement in postprandial plasma glucose by 4 units while postprandial plasma glucose increased in the standard group by 14 units compared to baseline. SKY could provide a non-invasive, low cost and easy to integrate adjunct therapy to manage DM. Since DM is also a major threat to cardiac illness, management of type 2 DM through SKY reduces the risk of cardiac disorders among diabetic individuals.

6. Cardiac autonomic function improved in patients with type 2 DM patients who practiced SKY for 6 months in addition to receiving standard of care, compared to patients who were on standard therapy alone. SKY has a cardioprotective effect in patients with type 2 DM diabetic patients, thus preventing sudden death due to heart disease.

7. A study measured the prevalence of type 2 DM in 4 slum areas in the city of Bengaluru, India, and found it to be higher than the prevalence among average Indian adults. SKY was provided as an intervention to those who were diagnosed with type 2 DM. After 40 days of SKY practice, the random blood sugar was reduced by 40% among SKY practitioners. The HBA1c also reduced by 12.7% in the intervention group, which was a far greater decrease than in the

control group. Similarly, the systolic blood pressure was reduced by 9.3%, and diastolic by 10.1%, among the SKY group. The SKY program was effective in improving dietary practices and medication adherence among diabetics, and helped to bring type 2 DM and hypertension under control for a higher proportion of individuals with DM.

8. This pilot study done in Kuwait shows significant improvement in anxiety, depression, quality of life and insomnia amongst diabetic patients after SKY intervention. A significant reduction of 44% was noted for the mean anxiety score, and a significant decrease of 33% was noted in the depression score post SKY intervention. SKY may be a potential lifestyle modification for the management of the psychosocial problems associated with type 2 DM.

9. A study on a comprehensive yoga module on type 2 DM patients and non-diabetic population demonstrated that a seven day SKY workshop can reduce the blood glucose level by 22% even among type 2 diabetic individuals providing an alternate therapy for diabetic patients with type 2 DM.

## **Conclusion**

Diabetes mellitus is one of the leading causes of mortality and morbidity in recent times. Most of the cases are affected with type 2 DM that are caused due to lifestyle factors. Diet, sedentary lifestyle and stress creates imbalances in key physiological processes in the body, causing chronic lifestyle disorders like DM.

Sudarshan Kriya is a breathing technique that helps reduce stress levels, manage lifestyle disorders, and restore metabolic homeostasis in the body. Studies looking at the effects of stress on glucose levels in humans have shown that mental or psychological stress causes a rise in glucose levels in people with type 2 DM. The SKY technique improves diabetic control and beneficially alters the lipid profile in diabetic patients, thus reducing the risk of complications. Quality of life is also improved with SKY practice. The SKY program has the potential of preventing sudden cardiac death by improving the cardiac autonomic function among diabetic individuals. Sudarshan Kriya yoga is an important lifestyle modifying factor that can be integrated into everyday lifestyle for a happier and healthier life.

## **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 the challenges of today. Its vision is to become an internationally renowned center of excellence for scientific enquiry into Global Ancient Knowledge Systems.

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