

## Yoga: Dawn of Hopes for Diabetes

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### Abstract

Diabetes mellitus has reached epidemic proportions worldwide as we enter the new millennium. WHO has commented there is 'an apparent epidemic of diabetes, which is strongly related to lifestyle and economic change'. Diabetes represents a spectrum of metabolic disorders, which has become a major health challenge worldwide now-a-days. The unprecedented economic development and rapid urbanization in Asian countries, particularly in India, China and Sri Lanka has led to a shift in health problems from communicable to non-communicable diseases. Of all the non-communicable diseases, diabetes and cardiovascular diseases lead the list. Yoga being an ancient and eternal science, having its different approaches including spiritual, therapeutic and developmental. However, the underlying premise of mind-body exercise modalities like yoga is that the physiological state of the body can affect emotions, thoughts, and attitudes, which in turn have a reciprocal effect on the body. The purpose of this study is to provide a comprehensive overview of the situation regarding yoga for diabetes mellitus, and explore the possible strategies that could be effective in combating the spread and focus on human being for healthy life. Various Medical researches approve yoga therapy as effective complementary therapy for several common ailments. Hence it has been concluded that Yoga cannot "cure" diabetes, but there are several ways yoga can be beneficial in controlling diabetes. Due to the potential impact glucose levels, and overall body function, regular practice of yoga may prevent and control the status of diabetes mellitus and produce optimum healthy population.

**Keywords:** Yoga; Diabetes Mellitus; Ayurveda.

### Introduction

*Ayurveda* is an ancient and eternal health science which deals with preventive as well as curative aspects of health. In fact, it is not only the medical system of treating disease; but also, is an immense science of life style. In order to gain and maintain the status of health; *Ayurveda* classics have mentioned

*Dinacharya* and *Ritucharya* deeply. A foretime, communities were often following it sincerely. Hence, the people were more immune and diseases were less occurred. But now-a-days, lifestyle has become changed at greater extent. All the three pillars of health i.e. *Ahar*, *Nidra* and *Bramhacharya* are affected thoroughly. Day-to-day life is being more hectic with sedentary works, stressful environment and quite negligence daily regimes. One face of life is much happy with reduced physical activity and at the same time, other face is showing many life style related disorders and health problems. Among them, '*Prameha*' is most common problem. By observing the features of *Prameha* at maximum extent; it can be very well correlated with the disease Diabetes mellitus.

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Diabetes mellitus (DM) is a chronic progressive metabolic disorder characterized by hyperglycemia mainly due to absolute (Type 1 DM) or relative (Type 2 DM) deficiency of insulin hormone [1]. The problem of diabetes has grown enormously in the last two decades. In 2014, around 387 million people had

diabetes with a prevalence of 8.3%; by 2035 this will rise to 592 million. The International Diabetes Federation (IDF) currently states that the top 5 countries with highest amount of diabetic patients are china, India, United States, Russia and Brazil. The number of people with type 2 diabetes is increasing in every country. 77% of people with diabetes live in low- and middle-income countries. 179 million people with diabetes are undiagnosed. Diabetes caused 4.9 million deaths in 2014 [2]. Primary prevention of diabetes by life style modification is a feasible solution to arrest the rising epidemic of the disease. Government and non-government organizations should create awareness about the disease among public and also teach them way to self-care and benefits of lifestyle modification.

### ***Factors Responsible for Rising Incidence***

Diabetes may result due to a lot of genetic-environmental interactions. The growing incidence of diabetes is mainly attributable due to the increasing rates of urbanization, migration from rural to urban areas and adoption of sedentary life style and unhealthy diet habits [3,4].

- ***Obesity***

Obesity frequently accompanies type 2 diabetes and many studies have shown it to be a powerful predictor of development of type 2 diabetes [5,6]. Obesity has increased rapidly in many populations in recent years because of an interaction between genetic and environmental factors such as metabolic characteristics, physical inactivity and high calorie composition of the diet [5]. This increase in obesity has been accompanied by an increasing prevalence of type 2 diabetes.

Those with higher Body Mass Index (BMI) have much higher incidence rates of type 2 diabetes at earlier ages than those with lower BMI among whom the incidence rise in the older age groups. A child gaining BMI faster than their peers is shown to be at increased risk of DM or metabolic syndrome later in life [7]. Obesity, especially abdominal is considered as a strong risk factor for Type 2 DM both in adults and children. Increased visceral fat is independently related to both increased insulin resistance and decreased insulin secretion. Amount of visceral fat in obese adolescents is directly correlated with basal and glucose stimulated hyper insulinemia and inversely relate with insulin sensitivity. Several studies indicate that waist circumference or waist-to-hip ratio may be a better indicator of the risk of developing diabetes than BMI [8]. Even though BMI

is important in predicting the risk, distribution of fat plays a major role in assessing the risk of type 2 DM in patients.

- ***Lack of Physical Activity***

*Acharya Vagbhata* mentions '*Ekasthanasana*' in *Hetus of Prameha* [9]. Now, it is seen that, during the last few decades, most of the working population had changed their lifestyle from active working occupations like agriculture to a less demanding works like office jobs. TV, video games too makes the children refrain from regular physical activity. It was observed that the prevalence of diabetes was almost 3 times higher in individuals with sedentary life style compared to those having heavy physical activity (23.2% vs. 8.1%) [10]. It was also noted that prevalence of metabolic syndrome and hypertension were also higher among people with light physical activity. Individuals with light grade physical activity had 2.4 times higher chance of developing coronary artery disease compared to heavy physical activity group [11].

- ***Diet***

The amount and quality of dietary fat modifies the glucose tolerance and insulin sensitivity [12,13]. A high fat content in the diet may result in worsening of glucose tolerance by several mechanisms including decreased binding of insulin to its receptors, impaired glucose transport, and decreased glycogen syntheses and accumulation of triglycerides in skeletal muscles [14]. The fatty acid composition of the diet affects the tissue phospholipids composition and also insulin action by altering membrane fluidity and insulin signaling.

- ***Stress***

Stress is defined as a 'stimulus event of sufficient severity to produce disequilibrium in the homeostasis of physiological systems' resulting from a variety of stressors. The neuroendocrine changes accompanying stress can translate the signals into path physiological alterations [15]. The hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous system (SNS) are triggered as a response to a stressor leading to a cascade of physiologic, behavioral, and psychological effects, primarily as a result of the release of cortisol and catechol amines (epinephrine and nor epinephrine). Due to repeated firing of the HPA axis and SNS, the system gets de-regulated, leading to diseases such as autoimmune disorders, obesity, diabetes, substance

abuse, depression, and cardiovascular disease [16,17]. Stress also plays a role in diabetogenesis. Changes related to stress precipitates hyperglycemia by increasing levels of hormones like glucagon, cortisol, growth hormone, catechol amines, Corticotrophin Releasing Hormone (CRH), prolactin, leptin, neurotrophin Y. Stress can lead to a series of hormonal changes leading to obesity and hence diabetes. Psychosocial stress may trigger the onset of visceral obesity and metabolic syndrome. HPA has been shown to be more active in pre-menopausal centrally obese women and in centrally obese men. Central android obesity and peripheral gynecoid obesity is associated with differential regulation of HPA and also targets metabolically important tissues such as liver and visceral fat. Chronic psychological stress was correlated with prevalence of type 2 diabetes mellitus and with visceral adiposity. The numbers of stressful events were positively associated with the prevalence of newly diagnosed diabetes [18].

### *Solution for the Diseased*

Life style intervention is the most assured solution. Diet, medicines (oral / insulin or other injectable), education and exercise are the mainstay in the management of diabetes. However, exercise is the most neglected part of management. If a proper exercise program accompanies the treatment, it would lead to drastic beneficial effects. Ancient context of *Ashtangahridaya* have been already advised hectic exercise for *Pramehi* in the form of “*Yojananam shatam yayat khandewa salilashayaan*” in *Prameha Chikitsa Adhyaya*.

### *Yoga*

In the present time, more and more people, especially the westerners are resorting to yoga to find cure for chronic health problems and attain a peace of mind. Yoga is one of the six schools of Indian philosophy and is also part of Ayurveda, which is an Indian traditional medical system. Health is promoted by seeking balance between the physical, spiritual, psychological, and social aspects. Yoga is an ancient art on a harmonizing system of development for the body, mind and spirit. The word yoga derived from the Sanskrit term “*Yuj*” which means ‘to join’, ‘to yoke’ or ‘to bind’ and attach. It also means union or communion. So the word yoga means union of body, mind and emotions. Patanjali defined the word of yoga means “*Yoga chitha Viruthi Nirodha*” Many styles of yoga are based on the eight-fold path outlined in Patanjali’s Yoga Sutras. Also known as the eight limbs of yoga, the eight-fold path includes: attitudes toward others/restraints (*Yamas*),

rituals/ self-observances (*Niyamas*), physical practice of postures (*Asana*), breathing practice (*Pranayama*), withdrawal of the senses (*Pratyahara*), concentration (*Dharana*), meditation (*Dhyana*), state of enlightenment (*Samadhi*) [19].

### *Yoga as Therapy*

Yoga is a practical science, Indian Psychology with its ideology and technology: as a holistic system for promoting harmony of physical, mental, emotional, social and lastly at spiritual levels. When this balance is disturbed by accident, illness, disorder or the stress created by any illness: physical or mental. Yoga can help restore it, and help cure or manage the illness. Yoga therapy is the adaptation of yoga practices for people with health problems. It is a tool to attain the integration.

Although ordinary yoga classes can improve general health and resolve mild complaints, but they may be ineffective or can be even harmful for serious conditions. In such cases, yoga therapy can help people by tailoring yoga life style to their individual needs, taking into account their health problems, flexibility, capacity, capability, habits, constitution and circumstances.

Yoga therapy is the adaptation of yoga practices for people with health challenges. Yoga therapists prescribe specific regimens of postures, breathing, exercise and relaxation techniques to suit individual needs. Medical research shows that yoga therapy is among effective complementary therapies for several common ailments. The challenges may be an illness, a temporary condition like pregnancy or a chronic condition with old age or infirmity.

### *Yoga Therapy for Diabetes*

- *Diet*

Diet plays an important role in the management of diabetes as it exerts a direct influence on the blood glucose level. The goal of diet therapy is to maintain and prolong a healthy, productive and happy life. Regular small meals complex carbohydrates such as wheat, oatmeal, corn, brown rice and beans, avoid refined food stuffs, junk food simple sugars such as white sugar, honey glucose and sweets. Take lots of green vegetables salads, bitter gourd. Maintain good hydration.

- *Suryanamaskar*

*Suryanamaskar* is very good exercise for people suffering from diabetes, it increases the blood supply

to various parts of the body, improving insulin administration in the body, it gives all the benefits of exercise if practiced at 3-6 rounds. One round of *Suryanamaskar* consists of twelve postures. It helps to burn out the excessive calorie. If practiced at slow speed, it offers the benefits of *asana*.

**Table 1:** Asanas beneficial in Diabetics

Sr. No.	Position of Asana	Names of Asana
3.1	Standing	Tadasana, Ardhakatichakrasana, Trikonasana.
3.2	Sitting	Dandasana, Vajrasana, Baddhakonasana, Paschimottanasana, Ustrasana, gomukhasana, Ardha matsyendrasana, Janu Sirsasana, Mandukasana
3.3	Prone	Mandukasana, Bhujangasana, Salabhasana, Dhanurasana
3.4	Supine	Navasana, Matsyasana, Suptaveerasana, Sarvangasana, Halasana, Savasana.

stretches and strains in the body, the internal organs are stretched and subjected to strain. This increases the blood supply, oxygen supply to the organs, increasing the efficiency and functioning of the organ. Stretching various glands results in increased efficiency of the endocrine system.

These asana have positive effect on pancreas and also insulin functioning. But to get this result, one needs to maintain the asana for a longer duration while relaxing the muscles.

- *Pranayama*

One of the basic preparations for *Pranayama* is *Nadi Shodhan Pranayama* or alternate nostril breathing; this type is found useful in diabetes as Alternate nostril breathing has a calming effect on the nervous system, which reduces stress levels, helping in diabetes treatment. Also, research has shown that *Bhramari* and *Bhastrika* Pranayama help in diabetes. *Bhramari* has calming effect on mind, brain and nervous system. *Bhastrika* Pranayama is revitalizing Pranayama, which increases oxygen levels and reduces carbon dioxide levels in the blood. In *Bhastrika* Pranayama, the abdominal muscles and diaphragm are used which puts pressure on the internal organs. But before practicing these Pranayama, one must learn and practice deep breathing, fast breathing, alternate nostril breathing, *Bandhas* (*Jalandhar bandha* or chin lock, *Moola bandha* and *Uddiyan bandha* or abdominal lock) from expert Guru. Note - *Pranayama* should be practiced under the expert guidance of *Yoga Guru*.)

- *Meditation*

Meditation is an important part of yoga practice. As much as stretching and moving help the body rest and rejuvenate, meditation is a healing balm for brain chemistry, helping to bring the mind to a state of awakened calm. Meditation and breath techniques

- *Asanas*

*Asanas* are beneficial in the treatment of diabetes. Important aspect of *Asanas* is stability and comfort experienced in the position. After attaining the position, one needs to relax all the muscles and try to maintain the positions for long. Due to various twists,

are being studied by scientists to discover how they work in helping people relax and lift their spirits. The meditations in *Kundalini* Yoga are described as benefiting the brain chemistry, the hormonal balance, and the stimulation of communication between the brain hemispheres [20].

Practice of meditation is especially useful in the management of stress. Relaxed and Concentrated state of mind is the aim of any form of meditation which creates a calming effect on the nervous system, brings balance between Sympathetic and Parasympathetic nervous systems. Initially meditation may be difficult, and one can practice Omkar Chanting, concentration on breathing. Especially for diabetes, concentration on pancreas during the meditation practice has shown positive effects on sugar levels. One can even visualize the proper functioning of the pancreas, proper insulin administration in the body can help in the treatment of diabetes.

- *Mudra -Yoga Element (Fingers)*

Thumb - Fire "*Angustha*",

Index - Air "*Tarjani*",

Middle - sky "*Madhyama*",

Ring - *Prithivi* (earth) "*Anamika*"

Little - Water "*Kanishtha*"

Chin Mudra, Pankaj Mudra, Apana Mudra, Varuna Mudra, Vayu Mudra, Linga Mudra, Sangu Mudra, Yoga Mudra.

- *Yoga Nidra*

Yoga Nidra is a very important process of deep relaxation; it helps alleviate the stress and has very good positive effects on the entire body- mind complex.

- *Cleansing Processes*

Master cleansing or *Shankha Prakshalana* is recommended for diabetes, complete *Shankha Prakshalana* takes 1 day and is recommended once in 6 months, but smaller version of it can be done 3 times a week. This process cleanses the Gastro Intestinal tract completely. This process is done by drinking 2 glasses of warm, salty water and lemon juice is added to it.

Then performing 6 different exercises, this exercises speed up the peristaltic movements and one needs to evacuate bowels. In 2 hours about 7 to 8 bowels are completed till the clear water is evacuated. (Note- This is a process which is to be practiced only under the expert guidance and under observation of medical professionals).

### Discussion

India has a high prevalence of diabetes mellitus and the numbers are increasing at an alarming rate. In India alone, diabetes is expected to increase from 40.6 million in 2006 to 79.4 million by 2030. Studies have shown that the prevalence of diabetes in urban Indian adults is about 12.1%, the onset of which is about a decade earlier than their western counterparts and the prevalence of Type 2 diabetes is 4-6 times higher in urban than in rural areas<sup>(21)</sup> Many studies have reported the beneficial effect of the practice of yoga on diabetes.

Some studies have mentioned up to 65 percent beneficial effect of yogic therapy for diabetes. Udupa has even mentioned 5 cases of juvenile diabetes that were completely controlled by yogic treatment. All of these studies have emphasized the possible mechanism of the yogic practices as:

1. Direct influence on pancreatic secretion by rejuvenation of the pancreatic cells, through alternate abdominal contractions and relaxation, during asanas (yogic postures which produce relaxation) and breathing exercises.
2. Reduction in blood sugar due to muscular exercise involved in the asanas. Meditation may modulate limbic system activity, which via the hypothalamus may modulate sympathetic nervous system activity and regulate endocrine secretions. Conditioning of these regions by practice of meditation may help in maintaining the normal homeostatic conditions. The fundamental effect of stress reduction may be an important factor contributing to seizure reduction and EEG changes [22].

It is beyond doubt that India has the largest number of diabetics in the world and the Government of India has rightly launched the national program for control of diabetes, cardiovascular diseases and stroke in January 2008. The responsibility of keeping our present as well as future race free from preventable diseases like diabetes, hypertension and CHD lies on each and every one of us. Hence intervention strategies like "Eat less, Eat on time and Walk more" have to be inculcated to save our children and youth from developing these present day disorders.

### Conclusion

Western medical research has focused upon diabetes as only a physical disorder, requiring only physical modalities of intervention. It has been able to confirm that regular physical exercise does have some beneficial effects in diabetics of both types, and that in those who are genetically predisposed to type II; it could prevent its development. Western studies have recommended exercise of moderate intensity, as a means to adopt a regular diet and insulin dosage, or to control body weight and improve circulation. Research in India has recognized it as a psychosomatic disorder with causative factors being sedentary habits, physical, emotional and mental stress. Many studies there have confirmed that the practice of the postures can rejuvenate the insulin producing cells in the pancreas of diabetics of both types, and that doing the postures in a relaxed manner, without exertion, yogic meditation and breathing help most patients to control the causes of diabetes. The practice of yoga regulates body physiology through control of posture, breathing, and meditation. Hence, Yoga helps in enhancing health and sense of well-being. There are several asana suggested in Yoga that actively works upon the human body to help to achieve a perfect balance between body requirements and energy produced. By balancing the hormonal production and organ functioning, yoga helps in healing several diseases and optimum healthy life. Hence it has been concluded that Yoga cannot "cure" diabetes, there are several ways yoga can be beneficial in controlling diabetes. If medically prescribed regimens are followed by diabetic patient, they can safely add yoga to their treatment. Due to the potential impact on their glucose levels, and overall body function, great strides can be made through regular committed yoga practice.

Therefore, regular practice of yoga may prevent and control the status of diabetes mellitus and produce optimum healthy population.

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