

THERAPEUTIC ROLE OF YOGA IN DIABETES MELLITUS

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ABSTRACT

Yoga is a method for balancing and harmonizing the body, mind, and emotions that has its roots in India and has been practiced for more than 5,000 years. Type 2 diabetes and other lifestyle disorders can be managed with the help of yoga. The therapeutic effects of yoga on diabetes involve immunological, neuroendocrine, and psycho-neuro-endocrine systems. Yoga practice integrated into daily life helps diabetics achieve glycemic control and lowers their risk of complications. Based on data from numerous clinical trials, we briefly summarize the function of different yoga practices in the treatment of diabetes in this review.

KEYWORDS: Yoga, asanas, diabetes mellitus, management.

INTRODUCTION

Yoga is a set of physical, mental, and spiritual disciplines that have their roots in ancient India. Our culture has a rich heritage in this area. In other words, yoga is the practise of paying attention to one's body, mind, and breath. The Sanskrit word "yuj," which meaning "to connect or integrate," is where the word "yoga" originates. Yoga is a 5,000-year-old body of knowledge from India that focuses on breathing exercises, yoga positions (or asanas), and meditation to bring the body, mind, and breath into harmony. It is helpful in the treatment of a number of lifestyle disorders, such as diabetes. Psycho-neuro-endocrine, immunological, and endocrine systems are the main processes influencing yoga's advantages for diabetes. According to numerous research accessible in the literature, including yoga practise into daily life helps diabetics achieve glycemic control and lowers their risk of complications.^[1]

The condition known as diabetes mellitus results in an unnatural rise in blood glucose levels because the body does not make enough insulin or react to it. A condition that prevents your body from effectively utilising the energy from meals can also be described in this way. Diabetes is mostly caused by a pancreas that produces insufficient amounts of insulin or none at all, as well as by insulin that doesn't function properly. Insulin resistance is the medical term for this issue. Type 1 and Type 2 diabetes are the two primary subtypes. The beta

cells, which are the pancreas' insulin-producing cells, become destroyed in type 1 diabetes. Little to no insulin is produced by the pancreas in type 1 diabetes. Insulin shots are necessary for Type 1 diabetics to maintain blood glucose control. Although it can arise at any age, type 1 diabetes is most prevalent in those under the age of 30. Type 1 diabetes affects 10% of those with the disease. In type 2 diabetes, also known as adult-onset diabetes, the pancreas produces insulin, but either not enough of it is produced or the insulin is not functioning effectively. Diabetes Type 2 affects 90% of those who have the disease. This type most frequently affects persons over the age of 40, though it can also strike children if certain risk factors are present.^[2]

The most common indications and symptoms of diabetes mellitus are increased thirst, frequent urination, extreme hunger, unexplained weight loss, the presence of ketones in the urine, fatigue, irritability, blurred vision, slow-healing sores, and frequent infections like gum, skin, and vaginal infections.

Diagnosis of Diabetes Mellitus

The diagnosis of diabetes is done through

- ❖ Blood glucose measurement
- ❖ Glycated hemoglobin (A1C) test
- ❖ Random blood sugar test
- ❖ Fasting blood sugar test
- ❖ Oral glucose tolerance test

❖ Screening for diabetes

Table 1: Diagnostic criteria for diabetes mellitus.

Diagnostic criteria for Diabetes mellitus			
	Normal glucose tolerance mg/dl	Prediabetes	Diabetes mellitus
Fasting plasma glucose mg/dl	<100 (5,6)	100-125(5.6-6.9)	>126(7.0mmol)
Two hrs after glucose load mg/dl	<140 (7,8)	>140-199(7.8-11.0)	>200 (11.1)
HbA1c (%) (ADA criteria)	<5.7	5.7-6.4	>6.5

Pathophysiology**Type 1 diabetes mellitus**

This type of diabetes was referred to as insulin-dependent diabetes or juvenile-onset diabetes. The β -cells in the pancreas are destroyed by the immune system in type 1 diabetes. There are various indicators of this autoimmune damage that can be found in bodily fluids and tissues, including Islet cell autoantibodies (ICAs), autoantibodies to insulin (IAAS), autoantibodies to glutamic acid decarboxylase (GAD65), and autoantibodies to the tyrosine phosphatases IA-2 and IA-2 β . Genetic factors, antibodies such as islet cell antibodies, insulin autoantibodies (IAA), anti-gad antibodies, etc., and environmental variables are some other factors that contribute to the pathophysiology of diabetes.

Type 2 diabetes mellitus

Formerly known as non-insulin-dependent diabetes mellitus (NIDDM), type II, or adult-onset diabetes, type 2 diabetes was formerly known as non-insulin-dependent diabetes mellitus (NIDDM), type II, or adult-onset diabetes. It is far more prevalent than type 1 diabetes and accounts for approximately 90% of all cases of diabetes. Generally, insulin concentrations are elevated, although they can also be normal or lowered. Obesity is a common risk factor, and weight loss ameliorates hyperglycemia. The condition typically manifests after the age of 40. Insulin is sometimes required to treat hyperglycemia, however oral hypoglycemic medications and dietary changes play the largest role in treatment. Insulin resistance, the most prevalent risk factor for type 2 diabetes, is characterised by a diminished ability of insulin to act on peripheral tissues. Insulin resistance, defined as a reduced physiologic response to normal amounts of circulating insulin, is the underlying pathogenic mechanism of main importance. The second factor is pancreatic β -cell dysfunction, which is characterised by a failure to produce enough insulin to overcome insulin resistance in peripheral organs. Insulin resistance and insulin secretion defects are caused by a combination of hereditary and environmental factors.^[3,4]

Risk Factors Involved in Diabetes Mellitus

Type 1 diabetes risk factors are not as well understood as type 2 diabetes risk factors. An established risk factor for type 1 diabetes is family history. Other risk factors include having certain pancreatic infections or illnesses. There are numerous risk factors for type 2 diabetes and prediabetes. Other risk factors include obesity or

overweightness, high blood pressure, elevated levels of triglycerides and low levels of "good" cholesterol (HDL), sedentary lifestyle, family history, advancing age, polycystic ovary syndrome, impaired glucose tolerance, insulin resistance, gestational diabetes during pregnancy etc.^[5]

Management of Diabetes Mellitus**Dietary advice**

Diet is crucial to the management of diabetes. In certain instances, dietary modification may be sufficient to control the condition. Studies have established that the rise and fall of blood sugar levels is dependent on the types of food consumed, such as starchy or sugary foods causing a rapid spike in blood sugar levels while protein and fat induce a more gradual rise. Fruits, vegetables, whole grains, lean proteins like poultry and fish, and healthy fats like olive oil and nuts are some of the suggested foods for diabetics.^[6]

Drug treatment

Drugs such as pioglitazone, metformin, repaglinide are prescribed for treating diabetes mellitus as shown in figure 1. However, Pioglitazone is associated with an increased risk of heart failure, bladder cancer and bone fracture.^[7,8]

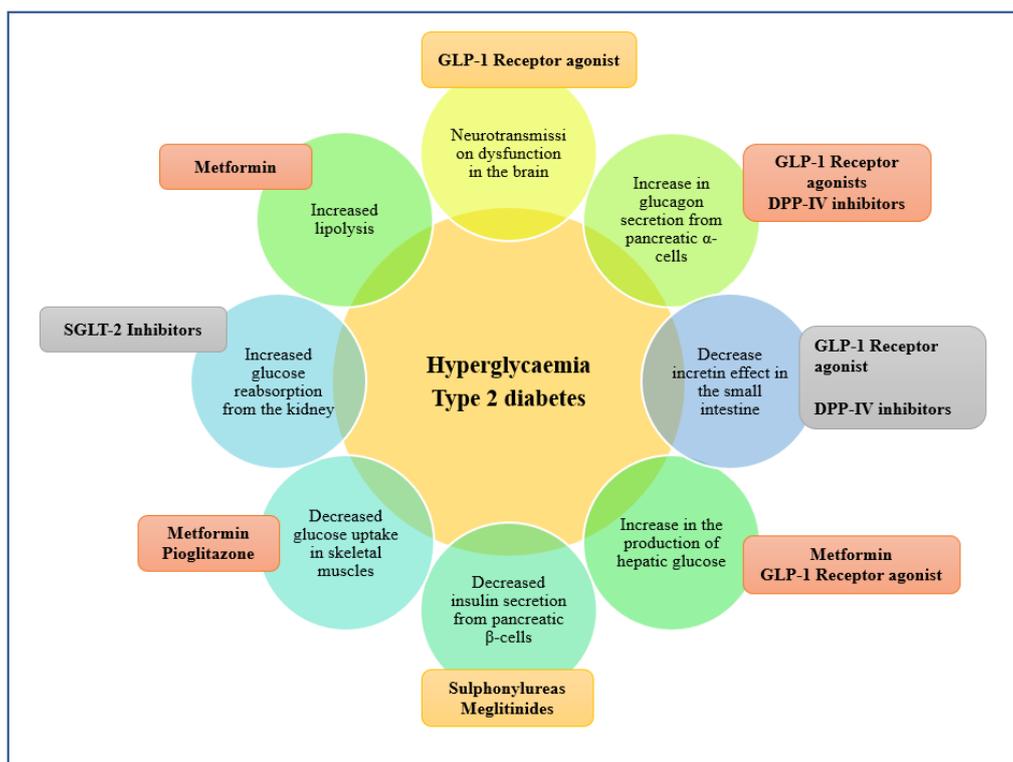


Figure 1: Figure represented the drug treatment used in diabetes mellitus.

Yoga management

Diabetes is a prevalent lifestyle illness characterised by insulin resistance and relative or absolute insulin insufficiency, which leads to chronic hyperglycaemia and a variety of cardiovascular problems. Yoga is also known to regulate eating behaviours, and its potential use in treating eating disorders has been promoted. It is claimed that the mind-body connection that develops during yoga practise facilitates self-awareness, introspection, and transformation. Yoga, pranayama, and sudarshan kriya have been demonstrated to improve food habits and medication adherence.

Yoga practise is a multifaceted intervention consisting of cleansing processes (kriya), postures (asana), controlled breathing (pranayama), meditation, relaxation, mantra chanting, a yogic diet, a code of conduct, philosophy, and spirituality. Numerous yoga practises have been discovered to aid in the control of diabetes. However, following a thorough evaluation of the patient's overall health, individual needs, related risk factors, and contraindications, their prudent usage is advised.^[9-11]

Table 2: Beneficial effects of yoga practice on Diabetes mellitus.

Yoga practice	Effects on diabetes mellitus
<i>Surya namaskar sun salutation</i>	Stimulate insulin production
<i>Hasta mudra (hand gestures)</i> <i>Apan mudra, gyan mudra</i> <i>Linga mudra, Surya mudra</i>	Promote deep relaxation Boost metabolic rate, promote weight loss, reduce sugar level
Yoga asana Forward bend Backward bend Inversion	Rejuvenates pancreatic cells through alternating abdominal contraction and relaxation, enhance insulin receptor expression in muscles Stimulate insulin secretion Exerts stimulating and energizing effect Improve blood circulation
Meditation	Positive effect on sugar level
<i>Shudhi kriya Kapalbhati (frontal brain purification)</i>	Abdominal pressure created during exhalation improve efficiency of β -cells
Mindfulness	Better sleep, grater relaxation
<i>Agnisar kriya (Pulling the abdomen in and snapping it backward and forward while holding one breath)</i>	Vacuum effect of this action massage the internal organ and increase blood flow to the area
<i>Vaman dhauti (stomach cleaning with</i>	Increase glucose uptake, minimize insulin resistance, promote insulin

induced vomiting)	function by reducing free fatty acid in body
Shankhprakashalana (cleaning of intestine)	Increase insulin production, reduce blood glucose level
Pranayama (regulate breathing)	Improve neuronal activities in brain centres
Anulom vilom	Improve health related fitness like cardiorespiratory etc.
Bhramari (humming bee breath)	Calming effect on mind
Uddiyan bandha (abdominal lock)	Negative pressure created in abdominal cavity improve pancreatic functions
Surya bhedan (right nostril breathing)	Sympathetic stimulation, recommended in diabetes mellitus.
"Aum" chanting	Stabilize brain, increase energy
Yoga nidra (yogic relaxation)	Reduce fasting glucose level and postprandial blood glucose level.

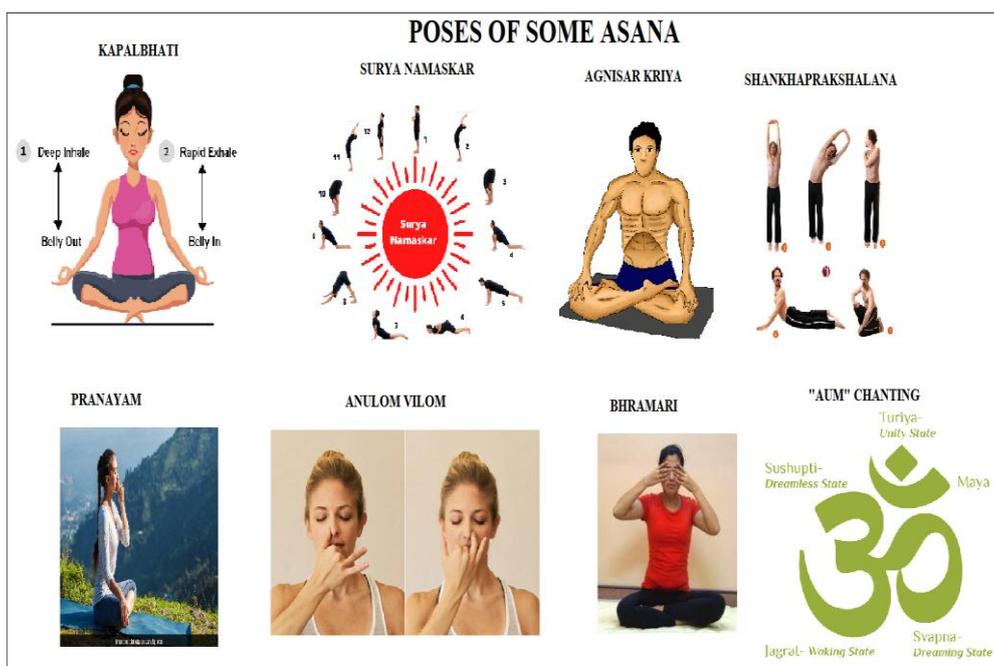


Figure 2: Depicting various yogasanas poses.

Prevention of Diabetes Mellitus

Type 1 diabetes is not preventable because it is caused by a problem with the immune system. On the other hand, some causes of type 2 diabetes, such as your genes or age, are not under your control. In contrary, diabetes prevention strategies involve making simple adjustments to diet and fitness routine. Some prevention tips from the American Diabetes Association have been given below.^[12,13]

Physical activity: There are many benefits to regular physical activity. Exercise can help you in losing weight, lowering blood sugar, boost your sensitivity to insulin that help in maintain blood sugar within a normal range. Research shows that aerobic exercise and resistance training can help control diabetes.

Plenty of fibre: Fibers reduce the risk of diabetes, heart disease and promote weight loss by improving blood sugar control. Foods high in fibre include fruits, vegetables, beans, whole grains and nuts.

Lose extra weight: Over weight is the primarily cause of diabetes now a days. Some studies from literature revealed that participants who lost a modest amount of

weight i.e., around 7 percent of initial body weight and exercised regularly reduced the risk of developing diabetes by almost 60 percent.

Skip fad diets and just make healthier choices: Low-carb diets, the glycemic index diet or other fad diets may help in losing weight.^[14]

Ayurvedic Medicines and Herbs

Ausadhi (Medicines) Drugs including Tikta, Katu, and Kasaya Rasa are advised in diabetes because they calm kapha and meda. Due to its innate guna & rasa, guggulu, haritaki, and amalaki provide relief from diabetes. preparation using ayurveda In all forms of prameha, avaleha such as Saraleha (a decoction of asana, khadira, babbula, and bakula, etc.) is also advised. Diabetes symptoms are relieved with gokshuradyavaleha, a concoction made from gokshura, trikatu, nagakeshara, cinnamon, ela, jatipatra, and vamshalochana.

Herbs Haridra demonstrated hypoglycemic and hypocholesterolemic effects, Methi also demonstrated hypoglycemic effects, Katuki offered hepatoprotective activity, and Shilajit rasayana decreased insulin resistance in T2DM patients. Giloya also possessed

hypoglycemic activity. Gudmar decreased blood glucose levels and promoted insulin secretion.^[15]

Rasausadhies and other ayurveda formulations for diabetes

- Panchanan Rasa
- Vanga Bhasma
- Yasada Bhasma
- Silajatu Rasayana
- Mehakalanal Rasa
- Rasasindoor
- Brihat vangeswara Rasa
- Amalaki Curna
- Karavellaka Phala Curna
- Chandraprabha.
- Mehari Ras
- Meghanada Rasa
- Guduchi swarasa

CONCLUSION

Both wellness and sickness can benefit from yoga therapy. It comprises purification techniques, asanas, pranayama, mudras, bandha, meditation, mindfulness, and relaxation techniques that have been shown in earlier research to lower blood glucose levels. Numerous ailments include hypertension, rheumatoid arthritis, musculoskeletal conditions, depression, and anxiety have benefited from yoga practice, which has been well-discussed in the literature. Previous research findings supported the potential benefits of yoga for altering lifestyle habits, immune system adjustments, parasympathetic system activation, and enhancing metabolic and psychological profiles, all of which have a cumulative impact on the management of diabetes.

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