



Yoga Management of Diabetes Type-2: An Disquisitional Study

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INTRODUCTION

Type 2 diabetes is a common lifestyle disease caused by insulin resistance with relative or absolute insulin deficiency leading to chronic hyperglycemia and various cardiovascular complications. According to the Diabetes Atlas of the International Diabetes Federation (eighth edition, 2017), there were approximately 425 million people with diabetes worldwide in 2017, and this number is predicted to increase to 629 million by 2045 [1]. Sedentary habits and unhealthy eating habits are the most important risk factors for various lifestyle disorders, including diabetes. Psychological stress also increases the risk and severity of diabetes. Lack of physical activity has been found to increase the risk of diabetes 3 times and the risk of coronary heart disease 2.4 times [2]. Yoga, which originated in India more than 5,000 years ago, aims to balance and harmonize the body, mind and emotions [3]. A growing body of evidence indicates that yoga practice intervenes in the pathophysiological mechanisms of diabetes and helps manage diabetes and its complications.

In this brief review, we briefly describe the role of various yogic practices in the treatment of diabetes based on evidence from various clinical trials.

YOGA FOR TYPE 2 DIABETES

Although yoga has been practiced since ancient times, yoga as therapy is still a relatively new and emerging trend in health care. Extensive studies have investigated changes in biochemical, electrophysiological, cellular, genetic, neuromuscular, and radiological parameters associated with yoga practice. This facilitated the practical application of yoga to various diseases and is now globally recognized as a clinically viable treatment. Traditionally a mind-body practice with the ultimate goal of spiritual enlightenment, yoga is a science of health management, not a therapy to treat specific ailments [4]. Dietary treatment of diabetes with yoga is also known to regulate eating habits, and its potential use in the treatment of eating disorders has been advocated. It is believed that the mind-body relationship resulting from yoga practice offers opportunities for

self-awareness, reflection, and change [5]. Yoga, pranayama, and Sudarshan Kriya have been found to be useful in improving adherence to diet and medication. Participation in yoga was associated with fruit and vegetable consumption as well as improved eating habits and conscious eating [5].

Purification Processes

The classical ancient texts Hatha Yoga Pradipika, and Gheranda Samhita describe cleansing and purifying practices known as shatkarmas. Among them, vamandhauti (cleansing of the stomach by vomiting), kapalbhati (cleaning of the front of the brain, which involves strong exhalation and automatic inhalation), and shankhprakhshalana (cleansing of the intestine) help to increase the production and control of insulin & blood glucose level. Regular internal cleaning improves the functioning of the organs. A study showed that practicing vamadhaut (the treatment of emesis) significantly reduced fasting and postprandial blood glucose [7–9]. It is believed to increase glucose, minimize insulin resistance, and promote insulin action by reducing circulating free fatty acids in the body. In Kapalbhati, expiratory abdominal pressure improves pancreatic β -cell efficiency. Shankhprakhshalana is a process of cleansing the intestines by practicing yoga postures and drinking lukewarm water and salt in between. This cycle is repeated until only water is drained. With this bowel cleansing process, blood sugar levels drop significantly. This practice is said to increase insulin production and help control diabetes [8]. Agnisar Kriya (Stimulation of Digestive Fire) involves pulling in the abdomen (uddiyan bandha) and clicking it back and forth while holding the breath. The "vacuum" of this action massages the internal organs and increases blood flow in the area. It increases the metabolism and facilitates the proper functioning of the abdominal organs [9]. This practice is recommended for the treatment of diabetes [8].

Asanas (yoga poses)

Asanas emphasize the relationship between body, mind, and consciousness, focusing on synchronizing breath and movement. These include stretching, rotation, and relaxation. The key to performing a yoga pose is to perform it stably and comfortably. Sitting postures like ardhmasyendrasana, yoga mudra, and mandukasana improve the functioning of the pancreas. Forward-bent asanas massage and squeeze the pancreas and stimulate insulin secretion. Twisting poses such as vakrasana and ardhmasyendrasana (seated back twist) compress and massage the intestines to prevent stagnation of colonic contents. For therapeutic benefits, the positions should be held for approximately 30 seconds to 1 minute, depending on individual ability, and the duration can be gradually increased. A study showed that yoga postures had a positive effect on glucose utilization and fat redistribution in patients with type 2 diabetes [11]. In diabetic patients, pancreatic cells can regenerate, and pancreatic β -cells can become more sensitive due to the alternating contraction and relaxation of the abdomen associated with yoga practice. Better blood flow to muscles can increase the expression of the insulin receptor in muscles, which increases glucose uptake [2]. A study found that optimal control of diabetes was achieved by practicing dhanurasana and ardhmatsayendrasana. Halasana, Vajrasana, Bhujangasana, and Naukasana have also proved effective. However, yoga mudra and shalabasana worsened the diabetic condition of the participants for reasons that are not clearly understood [12].

Pranayama (yogic breathing)

Pranayama is the practice of controlled or regulated yogic breathing. The slow breathing technique in pranayama causes significant changes in the body's physiology by controlling the autonomic nervous system; it harmonizes breathing rate and pattern and regulates heart rate and variability [15]. Slow pranayamas like anulomvilom (left nostril breathing), chandranadi (left nostril breathing), sitkari (cooling breath), and bhramari (bee humming breath) increase blood flow and oxygenation of the brain, which improves the functioning of the nerve centers of the brain, including the limbic regions and regions in the hypothalamus and core, and improves sympathetic outflow [15].

Bandha (Key)

Bandha refers to holding, tightening, or locking. It shrinks the center of the body and directs blood and lymph flow to other parts of the body. Asanas, or pranayama, can be combined with bandhas. Uddiyan bandha (abdominal lock), which involves creating negative pressure in the abdomen and contracting the abdominal region, can have therapeutic effects in the treatment of diabetes. It is believed that the negative pressure created in the abdominal cavity can improve the functioning of the pancreas.

Chanting Aum/Om

Scientific analyses have shown that chanting "Aum" is based on the physics of sound, vibration, and resonance and has a positive effect on health. Chanting the mantra "Aum" leads to stabilization of the brain, elimination of negative thoughts, increased energy, mental healing, and relaxation of the body in minutes of practice [20]. Pranava pranayama (chanting "Aum") produces an integrated relaxation response in the supine position, which may have clinical significance in the treatment of hypertension and diabetes [21]. An evaluation of the immediate effects of speech recognition technology on people with type 2 diabetes showed its potential role in improving cognitive function [22].

Sudarshan Kriya

Sudarshan Kriya is a special breathing sequence that includes chanting "Aum," ujjayi pranayama, and bhastrika pranayama, and rhythmic, cyclical breathing at slow, medium, and fast speeds. One study found that after practicing Sudarshan Kriya yoga and pranayama, diabetics significantly improved their physical, psychological, social, and general quality of life compared to a group that received only conventional treatment [23].

Dhyan (meditation)

Meditation has been shown to cause physiological changes in the brain. Meditators experience beneficial psychological effects such as faster responses to stimuli and are less prone to various forms of stress [24]. Mental stability achieved through meditation helps diabetics. Six weeks of meditation and Sahaja Yoga meditation therapy showed improvement in quality of life, reduction of anxiety, and control of blood pressure [25].

Mudras (gestures)

Mudras are a combination of subtle physical movements that change mood, attitude, and perception and deepen awareness and concentration [28]. Certain hasta mudras (hand gestures), such as linga mudra, surya mudra, and prana mudra, are believed to help with diabetes. Regular practice of these mudras boosts metabolism, promotes weight loss, and lowers sugar levels. Some other mudras, like apan mudra and gyan mudra, are recommended for diabetics for deep relaxation and tension. However, their individual effects have not been evaluated in scientific studies.

Duration and frequency of yoga practice

The recommended type, duration, and frequency of yoga practice are not clearly defined, and studies have analyzed different frequencies and durations of yoga practice. The duration of yoga practice varies between 10 minutes [14], 25–35 minutes [23], and 60 minutes per day [10], 45–60 minutes six days a week [29], and three 75-minute sessions per week [30], 90-minute sessions twice a week [9] showed beneficial results. Many studies reported beneficial effects after a 3-month intervention [9, 10, 14, 29, 30], while some studies evaluated 15-day [31], 40-day, and 6-month interventions [23]. Adherence to yoga practices has been shown to influence its beneficial effects [32]. Precautions and Contraindications Yoga should be learned under the guidance of a qualified yoga professional. There are many styles of yoga, and although many of them are safe, some can be stressful and may not be suitable for everyone. Fast yoga practice and vigorous exercise in

extreme temperatures, such as hot or bikram yoga, are not recommended for people with diabetes, cardiovascular disease, or who are at risk of complications. A relatively safe style of yoga suited to individual needs should be practiced. Beginners should avoid extreme exercises. Patients taking diabetes medications should carefully monitor their body's response to any new exercise activity. Ignoring the warning signs of pain and discomfort while practicing yoga can lead to serious injury.

Mechanism of trials and clinical trials

Yoga is based on the principle that the mind and body are intimately connected. It improves flexibility, muscle strength, circulation, and oxygen consumption [23]. Yoga has many health benefits, such as improving physical condition, relaxation, and self-awareness. Various lifestyle disorders, including diabetes, can be effectively treated through yoga practice if compliance is high enough. Yoga practice improves an individual's discipline regarding food and exercise, which helps to change the patient-related reluctance that leads to underutilization of exercise as a form of treatment [35]. Diabetes is a chronic metabolic disease that negatively affects the quality of life. Psychological stress and negative mood have bidirectional effects on diabetes management [36]. Stress increases the risk and severity of diabetes by stimulating the hypothalamic-pituitary-adrenal (HPA) and sympathetic axes and parasympathetic withdrawal, which increases levels of cortisol, adrenaline, norepinephrine, growth hormone, glucagon, catecholamines, prolactin, Y [leptin, and neuropeptides]. Chronic activation of the HPA axis is associated with poor control of diabetes and complications such as diabetic neuropathy. Increased levels of inflammatory cytokines cause insulin resistance in patients with type 2 diabetes. Chronic psychological stress can lead to insulin resistance, hypertension, and an increased risk of cardiovascular events [38]. Yoga effectively reduces stress and thus helps control diabetes [39]. Yoga has been found to increase well-being in healthy volunteers, reducing stress, depression, and anxiety; improving the physical, psychological, and social spheres and the general quality of life; fostering a sense of balance; and providing a new outlook on life [25, 39–41]. Yoga practice significantly improves ratings of various psychological assessments, including satisfaction, affect, and concern [42]. Yoga also improves physical exercise, behavioral changes, and dietary practices, in addition to influencing relaxation and stress management [35].

Yoga also prevents the development of diabetes in high-risk individuals [54]. It has been found to improve symptoms in diabetics [55]. It also results in reductions in fasting blood glucose, postprandial blood glucose, hemoglobinA1c, and the need for antidiabetic medications, suggesting improved glycemic control. Yoga therapy results in reductions in weight, body mass index, waist-to-hip ratio, body fat percentage, body fat mass, and skinfold thickness, resulting in increased lean body mass (Figure 1). Yoga lowers triglycerides, low-density lipoprotein cholesterol, and free fatty acids and improves high-density lipoprotein cholesterol [56]. It creates discipline in food and exercise [6]. Regular practice of yoga improves exercise tolerance, and yoga has been shown to improve performance in a treadmill test from 8 metabolic equivalents (METs) to 12 METs and delay the anaerobic threshold [57]. Some studies have shown that both systolic and diastolic blood pressure decreased in people who practiced yoga [58]. Regular practice of yoga reduces the risk of complications related to diabetes. Autonomic dysfunction of the heart is thought to be the cause of sudden death in patients with diabetes. Clinical studies have shown that regular yoga practice improves cardiac autonomic function independently of glycemic control and reduces the risk of cardiovascular events [59]. Yoga therapy also stabilizes the coagulation profile, which improves nerve conduction and cognitive function in diabetic patients [60].

CONCLUSIONS

Yoga therapy is important for both wellness and illness. Recent scientific evidence indicates a potential role for yoga-based lifestyle changes in the management of type 2 diabetes and associated risk factors. It has been assumed that psycho-neuro-endocrine and immune mechanisms have a holistic effect on the treatment of diabetes. Parasympathetic activation and related anti-stress mechanisms improve the general metabolic and psychological profile of patients, increase insulin sensitivity, and improve glucose tolerance and fat

metabolism. Yoga practices such as cleansing processes, asanas, pranayama, mudras, bandha, meditation, awareness, and relaxation are known to reduce blood glucose levels and help treat conditions associated with type 2 diabetes, leading to significant positive clinical results.

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