

Utility of Yoga in Diabetes Mellitus

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Abstract: *Diabetes mellitus is a very serious problem for present mankind as it comes under top ten leading cause of death worldwide. Diabetes is also a leading cause for most of the kidney failure, heart failure, blindness, atherosclerosis and amputations. Treatment options are only limited to correction of hyperglycemia and dyslipidemia but the pathology of disease remain continue in the active phase leading to different complications, so it is very difficult task for diabetologist to break the pathology of this disease completely. Drug cost, drug resistance and side effect of hypoglycemic drugs are also a big challenge, with these problems now scientist and researchers are working for the safe, effective, low cost and natural therapeutic measures. "Yoga" which is ancient health and spiritual science of Indian subcontinent could be a better alternative to modern therapeutic measures. Yoga offers a balanced approach to treating diabetes it affects both body and mind. Yoga is a rich heritage of our culture. Several our ancient sculpture make a mention of the usefulness of yoga in the treatment of Diabetes mellitus and preservation of health in normal individuals. Yoga has not only positive and long-term effect on diabetes but also it delays and prevent the complication of disease; however, this effects of yoga therapy on diabetes management remain unclear and a matter of debate and research. This paper offers a review related to role of Yoga in diabetes prevention and cure.*

Keywords: *Madhmeha, Diabetes Mellitus, complications, Yoga, body, mind.*

Introduction

Diabetes mellitus is a metabolic disorder resulting in hyperglycemia over a prolonged period of time and it affects your body's ability to use the energy found in food. Continuous hyperglycemia in blood produces the symptoms like polyuria (frequent urination), polydipsia (increased thirst), and polyphagia (increased hunger), generalized weakness, weight loss, numbness, tingling etc.[1]. In Diabetes pancreas unable to produce sufficient amount of insulin or when the body cannot effectively use the insulin it produces[2]. Insulin is a

key hormone that regulates blood sugar level in blood. Hyperglycaemia over long time in the body leads to serious complications like Neuropathy, Retinopathy, Nephropathy, Autonomic nervous system disturbances and limb amputations[3][4]. Diabetes is a serious life-threatening disease over time it can affect every cell of the body. A Diabetic patient very prone to various cardiovascular disorder also raises risks, stroke and sometimes malignancies[5]. In fact, at least 65% of people with diabetes die from heart disease or stroke, according to the National Institutes of Health. Now about 926 million diabetic patients reported worldwide and about 1.2 million deaths reported due to diabetes alone by year 2015. Diabetes also imposes a large economic burden on the national healthcare system. Health-care expenditures on diabetes will account for 12% of the total health-care expenditure in the world in 2015. Global health expenditures to prevent and treat diabetes and its complications will total at least US dollar 7.3 billion in 2015. By 2040, this number will exceed some USD 12.9 billion. An average of USD 703 per person will be spent on diabetes in 2015 globally[6].

At present number of anti-diabetic agents are available to correct hyperglycemia and dislipidemia generated by diabetes pathology but due to risk profile long term application of these drugs are restricted [7][8]. So, there is need of some better, natural, effective and low cost therapeutic measures to treat diabetes by alternative way.

Alternative treatments category include diet, lifestyle changes and natural medicines. Examples are Ayurveda, Yoga, siddha, Unani acupuncture, Homeopathy, biofeedback, aromatherapy, relaxation, and many others[9]. Out of them yoga is a no drug therapy also it is free of cost and effective therapeutic measure. The science of yoga is an ancient one and is a branch of the same great tree of Vedic knowledge that encompasses all of human life and the entire universe. Yoga includes some specific, time limit postural change (Asana) in the body and some breathing exercises (Pranayama) which strengthen and revitalizes all the systems, reduces oxidative and mental stress of the body. The Yoga asana are very useful for diabetes mellitus patients as its pathology covers all the system of the body and by

practicing these asana can revert the whole disease process.

Yogic practices in Diabetes mellitus:

Several studies have confirmed the usefulness of yoga in diabetes mellitus. Fasting and postprandial blood glucose levels came down significantly when patients advised to practice certain yoga asana. The attained good glycaemic status can be maintained for long periods of time. There is a lowering of drug requirement and the incidence of acute complications like infection and ketosis was significantly reduced by practicing yoga asana. There were significant changes in the insulin levels, free fatty acids, cholesterol and oxidants levels have been observed in different studies. Apart from these benefits significant decrease in the gross body mass, body mass index and waist hip ratio observed these patients. An improvement in insulin sensitivity and

Some Scientific research works that support utility of Yoga in Diabetes mellitus patients:

decline in insulin resistance also reported in the diabetic patient practicing yogasana daily. The main focus of this article towards the yoga asanas which not only prevent diabetes but also minimizes the long term complication without any cost[10, 11]. There are thousands of asana described by ancient scholars for healthy individuals but out of them following asana and pranayam are more beneficial for diabetes mellitus patients are Naukasana (Boat Pose), Bhujangasana (Cobra Pose), Halasana (Plough Pose), Vajrasana (Thunderbolt Pose), Yogamudra (Chic Union Pose), Shalabasana (Ocust Pose), Dhanurasana (Bow Pose), Ardha Matsyendrasana (Half Spinal Twist), Shavasana (Corpse Pose), Makarasana (Crocodile Pose), Surya Namaskar (Sun Salutation), Kapalbhati, Anulom Vilom Pranayam and Yoganidra

Name of Scientist	Objective	Inference
Singh et al. [12]	A preliminary report on the role of yoga asanas on oxidative stress in non-insulin dependent diabetes mellitus	Validated the efficacy of yoga in glycaemic control and on reducing the markers of oxidative stress: serum malondialdehyde (MDA).
Malhotra et al.[13]	Randomized controlled study for 40 days to see the effect of yoga.	Beneficial effect on glycaemic control and nerve conduction.
Malhotra V et al. [14]	Study of yoga asanas in assessment of pulmonary function in NIDDM patients	Improvement of glycaemic control and pulmonary function in type 2 diabetes patients was seen with yoga asanas
Singh et al. [15]	To assess the effect of yoga on glycaemic control and autonomic function in patients with diabetes for 40 day.	There was a marked improvement in the glycaemic profile inclusive of fasting blood glucose, postprandial blood glucose and HbA1c levels when compared with the baseline status.
Singh S et al.[15]	To study the effect of forty days of Yogic exercises on cardiac functions in Type 2 Diabetics. 2. To study the effect of forty days of Yogic exercises on blood glucose level, glycosylated hemoglobin.	A positive impact was also noticed on various autonomic indices such as the pulse, blood pressure and corrected QT interval ²⁶
Bijlani RL et al.[16]	Role of yoga in reducing the risk factors of diabetes - A short study of 10 days	Showed the effect of yoga in improving lipid profile and glycaemic parameters ³¹
Innes et al.[17]	Analysis of 70 previous studies to know the protective effect of effect of yoga in diabetes.	Yoga may reduce the insulin resistance related risks in relation to cardiovascular disease
Manjunatha et al.[18]	An investigation into the acute and long-term effects of selected yogic postures on fasting and postprandial glycemia and insulinemia in healthy young subjects	Studied the beneficial effect of yogic postures on blood glucose control
Khatri D et al.[19]	Effect of community-based yoga intervention on oxidative stress and glycemic parameters in prediabetes: a randomized controlled trial.	Yoga was found to be effective in reducing the waist circumference, blood pressure and improving the lipid and glycaemic profiles in metabolic syndrome
Amita et al. [20]	Assessment the effect of yoga nidra for three months among middle aged patients with diabetes on oral medications.	There was an improvement in symptom score, reduction of fasting blood glucose (22.75 mg/dl) and postprandial blood glucose by 18 mg/dl.
Kosuri M et al.[21]	To assess the role of yogic practice on physical and psychological parameters in diabetes patients	Yoga practice has also been shown to reduce anxiety and may improve overall wellbeing along with reduction in BMI

Joytsana et al.[22]	To evaluate the effect of yoga on glycaemic control and the quality of life of subjects with type 2 diabetes for a period of three months.	There was a significant improvement found in the quality of life in the yogic group and only a marginal impact on glycaemic control.
Seo DY et al.[23]	To evaluate the role of yogic practices in boys with obesity for a period of eight weeks.	It was found that yoga could significantly reduce the body weight, BMI, fat mass (FM) and body fat percentage and improve fat free mass and the basal metabolic rate ³⁹ .
Hegde et al.[24]	Community based study to evaluate the effect of yoga on oxidative stress	evaluated the effect of yoga on oxidative stress in prediabetes patients. At the end of three months, yoga was associated with reduction in malondialdehyde, a marker of oxidative stress.
Sarvottam K et al.[25]	Short-term yoga for 10 days to assess the effect of yoga on inflammatory markers in diabetic patients	Reduced the IL-6 level and increased the adiponectin level ³⁷
Kanayan et al.[26]	PRYSMS study – to evaluate the role of yogic practices in reduction of metabolic risk in metabolic syndrome patients.	Yoga group had a reduction in the levels of fasting blood glucose, HbA1c, low density lipoprotein cholesterol and increase in HDL.
McDermott et al.[27]	Pilot study to look at the effect of yoga in individuals at a high risk for diabetes. Each yoga session lasted for 75 min.	The study group showed a significant reduction in weight, waist circumference and an improvement in psychological wellbeing.
Youngwanichsetha S et al.[28]	To know the effect of yoga the Gestational Diabetes Mellitus patients were randomized into those on yoga and mindful eating, and a control group for eight weeks.	The difference in the mean fasting blood glucose, postprandial blood glucose and mean HbA1c levels between the two groups was significant, however, the clinical differences were rather small ²⁵ .
Netam et al. [29]	Demonstration of beneficial effects of short-term yoga-based lifestyle intervention programme on diabetes risk factors in obese individuals. The study included supervised yoga intervention for 10 days and a follow up at 30 days.	Significant reduction was observed in body weight, BMI, waist-hip ratio, blood glucose level and median fasting insulin and interleukin-6 (IL-6).

Conclusion:

Yoga is medium of physical and mental upliftment and it is practiced in india since several thousand years ago. Several research work proved its beneficial effect on body and mind. Yoga possess very potent curative effect for different diseases including diabetes mellitus. In diabetes patients yoga significantly decreases in fasting blood sugar and postprandial blood sugar level, Glycosylated haemoglobin (HbA1c) in diabetes patients. Practicing yoga rapidly correct dyslipidemia, basal metabolic rate and waist hip ratio. As we know that the key factor for diabetic complication and insulin resistance is continuous high oxidative stress and yoga miraculously decreases both of them gradually. Autonomic nervous system generally involved in diabetic patients but by practicing yoga, a positive impact also noted on autonomic function of body. The gist of the whole story is that Yoga is a boon for Diabetics if it is done under strict expert guidance.

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