

<https://doi.org/10.48047/AFJBS.6.Si2.2024.5566-5572>



African Journal of Biological Sciences

Journal homepage: <http://www.afjbs.com>



Research Paper

Open Access

YOGA- An allied approach in patients with Type II Diabetes mellitus

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Article Info

Volume6, IssueSi2, 2024

Received: 25 April 2024

Accepted: 01 June 2024

doi:10.48047/AFJBS.6.

Si4.2024.5566-5572

ABSTRACT: Diabetes Mellitus is a conglomerate of several diseases affecting several organs like the heart, Blood vessels, Kidneys, and Nervous system due to chronic Hyperglycemia occurring because of many causes. It is one of the most common non-communicable diseases in the world with India being the diabetic capital of the world. Type 2 DM is a heterogeneous disorder wherein there is a genetic predisposition and interaction between insulin resistance and pancreatic beta cell dysfunction. In addition to increased glucose levels, metabolic disorders of plasma lipid also occur in NIDDM (Non-Insulin Dependent Diabetes Mellitus) patients. Yoga is an ancient Indian system of attaining Moksha in eight-fold paths as stated by Maharishi Patanjali. Out of the third and fourth steps viz Asana (Physical exercises) and Pranayama are most extensively practiced in today's era in the management of various lifestyle disorders like hypertension, diabetes, and asthma as these physical exercises have been quoted to increase the strength of body and mind-. Asanas are physical exercises, and all physical exercises are known to reduce weight thereby increasing insulin sensitivity and thus reducing the risk of impaired glucose tolerance- Benefits of Asanas pertaining to both mind and body are not new to Indians as it creates lightness in the body, molds it and gives proper path to the natural urges. Pranayama is another step in Yoga that helps increase the time between inspiration and expiration thereby creating a firm balance on the activities of mind. This case study has been conducted to understand the effect of yoga on Type II Diabetes. In the following study, a total of pre-diagnosed patients specifically of Type 2 Diabetes were taken. Those with complications and complying with the exclusion criteria were not included in the study. Total patients were randomly allocated into 2 groups viz Trial group (Medicine, Yoga, and Pranayama) and Control group (Diet and oral medication). Results were seen in clinical parameters and were compared. To conclude, the student-paired t-test was done. It was concluded that yoga (Asanas and Pranayama) plays a pivotal role in bringing blood sugar levels down and can be considered adjuvant therapy in the management of Type 2 Diabetes.

INTRODUCTION: Diabetes mellitus, also called the “Iceberg disease” is a diverse group of disorders, presented by a state of chronic hyperglycemia, resulting from various etiological, genetic, and environmental factors.^{1,2,3,4} These factors contribute to the defective production of insulin from the Pancreas.⁵ Insulin is a hormone that controls glucose, fat, and amino acids metabolism. The disease is mainly characterized by the deficiency of insulin and lack of response from the target tissues.^{1,3}. Thus it is a catabolic disorder in which circulating insulin is virtually absent. It is also characterized by elevated plasma glucagon levels and failure of response of pancreatic beta cells to all insulinogenic stimuli.⁶ The metabolic dysfunction associated with diabetes mellitus (DM) causes secondary pathophysiological changes in multiple organ systems that impose a tremendous burden on the individual with diabetes and on health care system.⁷ Diabetes Mellitus is categorized under two broad headings, Type 1 and type 2 diabetes mellitus (DM).

Type 1 diabetes is the consequence of complete insulin deficiency.

Type 2 diabetes mellitus is a group of disorders characterized by variable degrees of insulin resistance, impaired insulin secretion increased glucose production, and abnormal fat metabolism.³

Type 2 DM is more common than type 1 DM. According to WHO, there are over 400 million patients with Diabetes all over the world and India is known as the diabetic capital of the world. Type 2 diabetes mellitus in Indians is being increasingly seen in younger and less obese persons than in western countries with the main etiology being a change in lifestyle due to Industrialization and improved facilities in our country in the past few decades. Due to advancements in technology, the use of machines in the form of vehicles, mobile phones, computers etc. has increased. This has contributed to the decline in physical activities, excess food intake with fat-dense calories, and stress of working. All these factors along with increased longevity of the individuals contribute to the increased prevalence of diabetes in our country. Thus, uncontrolled progression of the disease with daily emergence of new cases may result in a greater loss of productivity and consequently put a higher financial burden on the Indian economy.

The earlier onset, coupled with delayed diagnosis and improper care may also lead to a high complication rate. About 30% of type 2 diabetes is preventable by changing diet, increasing physical activities, and improving the living environment. Nowadays more stress is put on preventing type 2 diabetes mellitus and its complications by proper diet, exercise and mental relaxation.

Among the various practices adopted for the prevention and progression of the disease, the science of yoga is an ancient one. Yoga is a practical discipline integrating a wide variety of practices whose objective is the development of a state of mental and physical health, wellbeing and ultimately ‘a union of the human individual with the universal and mystical existence.’^{8,9,10}

Yoga is important to increase the strength of body and mind and push the limits in order to gain knowledge.¹¹ On the physical level yoga asana (any posture that is steady and comfortable) are designed to tone, strengthen, and align the body.^{12,13} These postures are performed to make the

spine supple and healthy and to promote blood flow to all the organs, glands and tissue keeping all bodily systems healthy.¹⁴

On the mental level yoga uses breathing technique Pranayama (control of prana, i.e. source of energy) and Meditation (dhyana) to quiet, purify and discipline the mind. So yoga is not a religion but a way of living with sound health and peace of mind.¹⁵

By yogic exercises, the muscles absorb the excess glucose in the blood, thereby reducing the blood sugar level. They help in the effective functioning of liver and pancreas, which regulates the blood sugar levels. Asanas help in rejuvenation of the pancreatic cells, thereby enhancing insulin secretion. The muscular movements also help in reducing the blood sugar levels by increasing the glucose utilization. Asanas induce relaxation, which also plays a key role in the healthy functioning of the internal organs of the body.¹⁶

The present study aims to evaluate the effect of yogic asana and pranayama on various biochemical parameters of type 2 diabetes mellitus patients over a period of 40 days.

MATERIAL AND METHOD: Biochemical parameters before and after 40 days of Yogic exercises by Type 2 Diabetes Mellitus patients were conducted.

SELECTION OF SUBJECTS: Fifty diagnosed patients of NIDDM, with a history of diabetes for 0-10 years, in the age group of 40 – 60 years, were selected. The diagnosis of Type 2 Diabetes Mellitus (NIDDM) patients was done as per the WHO guidelines.

The objectives of the present study were thoroughly explained to all the subjects. A written, duly signed consent was taken from the subjects as per the guidelines from ICMR.

METHODOLOGY: The patients were randomly allocated to two separate groups.

Group I (n = 25) Type 2 Diabetes Mellitus patients given various Yogic asana for 40 days, together with diet and diabetic medicines. All these patients performed yoga asana and pranayama for approximately 30 minutes per day for 40 days under the supervision and guidance of a yoga expert. Group II (n2= 25) Type 2 Diabetes Mellitus patients or the control group patients, were retained on diet plus normal medical therapy. The controls were matched with to age, sex, BMI, duration of diabetes and glycemic base line parameters.

EXCLUSION CRITERIA:

The study excludes the

1. Patients with type 1 DM
2. Patients >25 BMI as for obese person it was difficult to do yoga asanas.
3. Alcoholic- as it might have an inebriant effect during performing asanas as well as altered sugar levels during examination.

4. Patients already doing any kind of yoga asanas as they are habituated and might alter the parameters.

5. Type 2 Diabetes Mellitus patients with nephropathy. As this is the late complication of Diabetes and it involves multiple organs.

6. Type 2 Diabetes Mellitus patients with retinopathy. As this is the late complication of Diabetes and it involves multiple organs.

(The subjects were subjected to a baseline ophthalmological fundus examination to exclude retinopathy.)

7. Type 2 Diabetes Mellitus patients with coronary artery disease (CAD).

(A baseline complete electrocardiogram and 2D echo were done in every patient to rule out CAD.

YOGA GROUP: 25 subjects in the Yoga group (n1) were kept on a prescribed diet and oral antidiabetic medicines as prescribed by their clinician and they performed specific asanas and advised Pranayama with expert guidance.

The important parameters before the commencement of the Yoga exercises (baseline values) and after the Yoga therapy were recorded.

YOGA PROTOCOL:

- All the subjects within the yoga group were taught Yoga asana and pranayama.
- The duration of practice was 30 to 40 minutes from 7A.M. to 7:30A.M.
- It was advised to keep bowel and bladder emptied prior to commencement of Asanas.
- The duration of asana was 15 minutes approximately and that of pranayama was 15 minutes approximately.
- Shavasana was performed in between two asanas to regularize the breathing. Taking mental awareness, particularly the parts of the body being activated in an asana is very important. This helps in the relaxation of the mind during the session.
- Specific care was taken regarding individual body constitution and limitations. They were advised not to strain too much to attain the correct posture. The body gets gradually tuned, with regular practice.

Asanas that were advised for the particular duration are-

1.	PAWANMUKTASANA	2min
2.	SURYANAMASKAR- 2 rounds (all 24 asanas)	2min
4.	NAUKASANA (5-8 repetitions)	1min
5	VAJRASANA with deep & slow breathing	2 min

Between each asanas patients were advised Shavasana.

Pranayama which was advised are-

1	Kapalabhati pranayam	5 Min
2	Bhramari pranayam	3 Min
3	Anulom vilom	5 Min
4	Om chanting	2 Min

Biochemical parameters:

The parameters studied in the biochemical investigations are-

- Blood glucose level (Both fasting and PP)
- Glycosylated Hemoglobin (HbA1C)
- Lipid profile.

STATISTICAL METHOD: Student's paired t-test was done to compare the changes in biochemical parameters at the beginning and end of the study in case and control group respectively. Then a comparison between the changes of respective parameter in both group (case and control) was done by independent t-test. P value <0.05 is considered significant.

OBSERVATION:

- The study population included 32 male (64%) and 18 female (36%).
- Most of the diabetic population included in the research belonged to the 40–49-year age group (66%).
- Fasting blood glucose (FBG) was decreased from 178.53±64.92 mg/dl to 119.2±73.62 mg/dl, which was significant at a p value of 0.05.
- Postprandial Blood Glucose (PPBG) after two hour of food intake also decreased from 260.63±73.62 mg/dl to 159.9±52.69 mg/dl at a p value of 0.05.
- There was a decrease in the fasting blood glucose (FBG) from 200.03±42.67 mg/dl to 193.07±43.89 mg/dl, which was significant at a p value of 0.05. Postprandial Blood Glucose (PPG) after two hours also decreased from 259.5±50.39 mg/dl to 251.33±49.02 mg/dl at a p-value of 0.05.
- There was a decrease of glycosylated hemoglobin from 7.73±0.5 % to 7.61±0.68%, was significant at a p value of 0.05.
- There were decreases in the values of Cholesterol, Triglyceride, LDL, and VLDL and there was rise in HDL

DISCUSSION: The present study is to assess the “Effect of yoga in patients with type 2 diabetes mellitus.”

After applying the relevant statistical tests and data obtained from publications, it can be said that, yoga may help in decreasing blood sugar level and keep diabetes in control

It was observed that fast blood glucose levels were considerably reduced in groups who performed yogasana. The decrease in blood sugar may be due to the increased sensitivity of the beta cells of pancreas to the glucose signal. The increased sensitivity remained for a long time resulting in a progressive long-term effect of asanas.¹⁷

In the present study, the patients in the trial group have shown a decrease in glycosylated hemoglobin. This may be probably due to the overall sugar levels which got reduced led to decrease in HbA1c too. The reduction in glycosylated Hb protects the patients from early development of many microvascular and macrovascular complications of diabetes mellitus.

The change in lipid profile status i.e. increase in serum HDL and decrease in serum cholesterol, triglyceride, LDL, and VLDL prevents the early development of comorbid conditions like hypertension, and coronary artery disease.

The improvement in lipid profile after yoga could be due to increased hepatic lipase and pancreatic lipase at cellular level, which affects the metabolism of lipoprotein and thus increases the uptake of triglyceride by adipose tissue.

By modifying the state of anxiety, yoga reduces the stress-induced sympathetic activity, thus maintaining a better balance between the sympathetic and parasympathetic systems. Thus, a decrease in sympathetic discharge and a better ability to overcome stress can be taken as possible mechanisms for the improvement in lipid profile.

Meditation also influences metabolic activity by reducing adrenocortical activity, long-term decreased secretion of cortisol, and decreased thyroid stimulating hormone.

All the patients in the yoga group develop a sense of wellbeing without any side effects. So, they are self-motivated to continue yoga practice as a daily routine in their life.

The practice of yoga asanas and pranayama may be helpful in reducing body weight in obese people because of which remote complications of diabetes mellitus may be prevented. Further studies may be conducted to prove the efficacy of yoga in the control of obesity.

Thus, yoga asanas and pranayama may be used as an adjuvant therapy along with the medications to optimize the biochemical parameters. Yoga also helps diabetic patients with drug dose reduction, increases physical and mental alertness, and prevention of complications. It plays a pivotal role in enhancing the quality of life of patients with Diabetes.

So yogic practice has a role in both primary and secondary prevention of diabetes mellitus. Therefore, yoga therapy may be considered the best complementary therapy for the management of type 2 Diabetes mellitus.

CONFLICT OF INTEREST -NIL

FINANCIAL SUPPORT- NONE

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