

## Research Article

# Importance of yoga in diabetes and dyslipidemia

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## ABSTRACT

**Background:** The present study was aimed at studying the effect of practicing yoga in patients with type 2 DM for 4 months. The practice of yoga in these patients resulted in a decrease in body weight, total cholesterol, triglycerides and LDL cholesterol and an increase in HDL. Yoga based programs are a low-cost intervention strategy to improve physical and psychological well-being. Rhythmic extension and bending in yoga provides stimulation to organs and glands without straining the muscles. Yoga could be also useful in patient suffering from insulin resistance syndrome.

**Methods:** 50 patients with known type 2 diabetes mellitus and dyslipidemia were selected for the study. Known diabetic patients on treatment with sulphonylurea were also included in this study. 50 patients with type 2 DM attending the diabetic clinic were randomized into control group and study group of 25 patients each. The study group was on oral hypoglycemic drugs, lifestyle modification and yoga for a period of 4 months. The control group was prescribed oral hypoglycemic drugs only and did not perform yogic exercises during this period.

**Results:** 4 months of study has shown that patient enrolled in study group had mild decrease in BMI, and body weight which was not statistically significant but there was a significant reduction in total cholesterol, triglycerides and LDL cholesterol, apart from it, there was a non-significant elevation in HDL. Control group showed a significant increase in body weight. It was also noted that there was non-significant increase in total cholesterol, triglycerides and a decrease in HDL. The bodyweight increase could be attributed to drugs like Sulphonylurea also.

**Conclusions:** Yoga has been tried for its benefit not only in India but also in developed countries. In view of the benefits of yoga therapy in short-term studies and long-term studies, more awareness and emphasis should be given for it. Patient should be explained clearly about the beneficial effects of yoga. Yoga can help in improved lipid profiles, lower BMI, and lowers glycemic levels which can have a long term beneficial effect on Micro and macro-vascular complications in diabetes.

**Keywords:** Diabetes, Yoga, Dyslipidemia, Lipid parameter, Exercise

## INTRODUCTION

In India, there is rampant increase in the incidence and prevalence of type 2 diabetes mellitus. Kutty BM, Raju TR et al demonstrated that nearly 30 million people are suffering from diabetes and this figure is expected to increase to 60 million by 2017.<sup>1</sup> In 2011 at United nation general assembly there was discussion on control and prevention of Non communicable disease because it has

been shown that the incidence of death due to non-communicable disease (like Cancer, cardiovascular disease, diabetes) is far greater than communicable disease.<sup>2</sup> In the present era of global economic issues the situation can worsen more due to high cost incurred in treating chronic diseases, so the emphasis should be given on cost effective methods for prevention of diabetes like yogi therapy.

The word yoga is taken from Sanskrit word 'Yuj'. Yoga stands for union of the mind, body, and breath. Yoga is practiced from ancient ages and its importance has been realized now. Yoga constitutes of asanas, pranayama, and sutras. Regular practice of yoga exercise helps in good control of body and mind and it also enhances awareness of mind and body.

The management of diabetes requires diet modification, weight reduction, regular monitoring of fasting and postprandial levels, medication for control of glycemic status, foot care and learning newer modalities like SMBG. Nowadays we care more about acute medical illness rather than chronic diseases. It is projected that in India there could be increase in the prevalence of diabetes mellitus by 60% which can lead to a burden on economy by 50% during the same period. These are overwhelming numbers, and it may be pertinent to roll out newer highly successful, evaluated and prevention program that should be cost effective rather than extremely costly. If these costly projects and programs are rolled out universally it would lead to bankrupt the majority of nations. Evidence from randomized controlled trials (RCT's) have already shown the usefulness, though expensive nature of carrying out lifestyle intervention programs.<sup>3-5</sup>

#### **Types of yoga for diabetic patients**

There are various methods and posture (Asanas and Pranayama) available, but of which 9 common type of yoga postures are advisable for all diabetes patients including high risk in individuals. Nine types of yoga posture are listed below: Utthita Parsvakonasana, Parivrtta Parsvakonasana, Paschimottanasana, Janu sirshasana, Makarasana, Dhanurasana, Halasana, Ardhamatsyendrasana, Shashankasana.

#### **METHODS**

50 patients with known type 2 diabetes mellitus and dyslipidemia were selected for the study. Known diabetic

patients on treatment with sulphonylurea were also included in this study.

**Inclusion criteria:** History of these 50 patients was taken along with other parameters documented were as follows: age, gender, disease and treatment history documented, fasting blood glucose, post prandial blood glucose, lipid parameters like triglycerides (TG), total cholesterol (TC) and high-density lipoprotein-cholesterol (HDL-C). Cholesterol was estimated.

**Exclusion criteria:** Alcoholics, pregnant, patient receiving drugs like steroids, coronary artery disease, smokers, cerebrovascular diseases, immuno-compromised patients, physical disability.

50 patients with type 2 DM attending the diabetic clinic were randomized into control group of 25 patients, out of which 14 males and 11 females and Study group of 25 patients, out of which 12 males and 13 females. The study group was on oral hypoglycemic drugs and in addition followed lifestyle modification in the form of 1 h daily practice of yoga for a period of 4 months. The control group was on oral hypoglycemic drugs and did not perform yogic exercises during this study period. The control group was followed in outpatient department monthly. There were no alterations made in the treatment and dietary habits of either group during the study period. Both the groups were advised to continue with their carbohydrate restricted fiber rich diet.

#### **RESULTS**

A total of 50 type 2 diabetes mellitus patients were enrolled, out of which 26 people are males and 24 people are females. The mean age in the control group of patients is 40 years and the mean age in the study group is 41 years (Table 1). The average duration of diabetes in the participants was 4 - 6 years. Both the groups were similar in respect to mean age, sex, weight, glycemic control, serum triglycerides and HDL levels. The total cholesterol and LDL levels were, however, significantly higher in the study group compared to the control group.

**Table 1: Baseline parameters.**

Parameters	Control group n =25	Study group n = 25
Mean age (years)	40.28±11.68	41.27±6.99
Male	14 (56%)	12 (48%)
Female	11 (44%)	13 (52%)
Weight (kg)	65.38±4.49	65.17±4.57
FBS (mg/dl)	164.12±34.29	160.81±41.55
PPBS (mg/dl)	257.13±84.20	249.31±78.41
Total cholesterol (mg/dl)	230.14±39.20	240.36±29.01
Triglyceride (mg/dl)	181.47±46.59	158.49±39.06
LDL cholesterol (mg/dl)	130.22±29.34	145.24±24.10
HDL cholesterol (mg/dl)	45.21±5.12	45.29±8.92

**Table 2: Pre and post yoga study group.**

Parameters <i>n</i> = 25	Pre-yoga (mean±SD)	Post-yoga (mean±SD)
Weight(kg)	65.17±4.57	61.80±4.69
FBS	160.81±41.55	118.12±20.35
PLBS	249.31±78.41	160.42±39.60
LDL cholesterol (mg/dl)	145.24±24.10	121.36±32.88
HDL cholesterol (mg/dl)	45.29±8.92	46.15±5.19
Triglycerides (mg/dl)	158.49±39.06	134.62±26.19
Total cholesterol (mg/dl)	240.36±29.01	214.11±31.48

The study showed that 4 months of yoga practice resulted in a non-significant decrease in BMI. A significant decrease in the weight from 65.17±4.57 to 61.80±4.69 kg

There was a significant reduction in Fasting and Post prandial glucose levels, total cholesterol, triglycerides and LDL cholesterol. Mean total cholesterol before yoga was 240.36±29.01 mg% and was reduced to a mean of 214.11±31.48 mg%. Triglycerides showed a significant

reduction from 158.49±39.06 mg% to 134.62±26.19 mg% while the LDL reduced from 145.24±24.10 to 121.36±32.88 mg%. There was a non-significant elevation in HDL from 45.29±8.92 mg% to 46.15±5.19 mg % (Table 2).

After a period of 4 months the control group showed a significant increase in body weight, non-significant increase in total cholesterol, triglycerides and a decrease in HDL (Table 3).

**Table 3: Pre and post control group.**

Parameters <i>n</i> = 25	Initial value (mean±SD)	Follow up (mean±SD)
Weight (kg)	62.17±4.67	63.03±5.10
FBS	164.12±34.29	138.12±20.35
PLBS	257.13±84.20	196.17±41.28
LDL cholesterol (mg/dl)	130.22±29.34	129.10±23.82
HDL cholesterol (mg/dl)	45.21±5.12	43.90±7.24
Triglycerides (mg/dl)	181.47±46.59	179.11±60.28
Total cholesterol (mg/dl)	230.14±39.20	235.88±30.59

## DISCUSSION

The aim of the present study was to see the effect of practicing yoga in patients with type 2 DM. The practice of yoga in these patients resulted in a decrease in body weight, total cholesterol, triglycerides and LDL cholesterol and an increase in HDL. A total of 50 type 2 diabetes mellitus patients were enrolled, out of which 26 people are males and 24 people are females. The study showed that 4 months of yoga practice resulted in a non-significant decrease in BMI, whereas there was a significant decrease in the 1) weight 2) Fasting and Post prandial glucose levels, 3) total cholesterol, 4) triglycerides and 5) LDL cholesterol. Mean total cholesterol before yoga was 240.36±29.01 mg% and was reduced to a mean of 214.11±31.48 mg%. Triglycerides showed a significant reduction from 158.49±39.06 mg% to 134.62±26.19 mg% while the LDL reduced from 145.24±24.10 to 121.36±32.88 mg%. There was a non-significant elevation in HDL from 45.29±8.92 mg% to 46.15±5.19 mg%. (Table 2). After a period of 4 months the control group showed a significant increase in body

weight, non-significant increase in total cholesterol, triglycerides and a decrease in HDL (Table 3).

Burstein M et al have suggested that carefully controlled treatment measures with exercise, dietary modification and oral drugs can be expected to improve diabetic lipid disorder. The effect of exercise on blood lipid profiles has been widely reported Szapary PO et al has shown that Physical activity raises HDL levels and decreases the concentration of very low-density lipoprotein cholesterol and triglycerides.<sup>6,7</sup>

Long duration of practicing yoga has shown beneficial effect on cardiovascular system. A randomized controlled trial showed that diabetic patient with cardiac comorbid had performed yogic breathing program for 6 months than compared to standard treatment alone. It was shown that those patients who were on yogic exercise had better glycemic control and lesser incidence of cardiac abnormalities. It is also known that cardiac dysfunction is a cause for sudden cardiac arrest in diabetic patients, it was seen that patient who had been on yogic exercises

had lesser incidence of sudden cardiac death than compared to others.

Caro JF et al had shown nearly 80% of diabetic patient live in the developing countries and nearly 70 to 80% of expenditure for the modern medical care is funded by developed countries.<sup>8</sup> Tuerk PW et al a study was conducted to know the causes of variability in HbA1c; it was shown that patient related factors was more responsible than physician related factors. Patient related factors can be controlled by yoga and if these factors are controlled the glycemic levels will be under controlled.<sup>9</sup>

According to the guidelines laid by American Diabetes Association it is clearly defined that regular exercise and moderate cardiovascular exercise training of at least 150 min/week, alone or in conjunctions with resistance exercise training 3 times per week, has shown to better glycemic control, enhanced insulin sensitivity, and weight loss.<sup>10</sup> The cornerstone treatment for prevention and treatment diabetes is regular exercise training which is underutilized by the diabetic patient. In this context, the importance of yoga is related to the ease of use, safety, and multiple psychological benefits like reduction of stress and mentally well-being.

Yoga-based programs should be low-cost intervention strategy to improve physical and psychological well-being. Yoga provides slow rhythmic movements; by easy extensions and bending without over-stimulate muscles which can results in stimulation of the organs and glands. Yoga could be also useful in patient suffering from insulin resistance syndrome. The insulin resistance syndrome or metabolic syndrome is a characterized by hyperglycemia, obesity (central), hypertension and dyslipidemia. Patient with metabolic syndrome have insulin resistance due to i) cardiovascular reactivity enhancement ii) decreased parasympathetic tone and iii) Increased sympathetic activity. Major recent advanced research have shown that chronic stress (psychological) and negative affective states are the contributing factors towards the pathogenesis and progression of insulin resistance, intolerance of glucose, hypertension, and other IRS-related conditions.<sup>11-13</sup>

Agrawal RP et al, Jain SC et al, studies has shown significant improvement in fasting blood sugar, glycated hemoglobin (HbA1c), and cholesterol levels with yoga therapy. Significant improvements were also seen in the scores of psychological assessment (satisfaction, worry and impact). There was also significant reduction in the doses of oral hypoglycemic drugs and insulin after yoga therapy and lifestyle modification. Jain SC et al (in addition to *Asanas* and *Pranayama*, the *inpatient yoga therapy* was accompanied with *visceral cleaning procedures*) was undergone by 149 patients for 40 days. This study showed that, patient with type 2 diabetes of lesser than 10 years duration and fasting glucose levels less than 140 mg/dl, hyperglycemia was controlled by yoga therapy alone. However, patients with very severe

hyperglycemia required both would yoga therapy and oral hypoglycemic drugs.<sup>14,15</sup>

Bijlani, *et al*, within a short duration of study for 10 days had shown significant reduction in fasting glucose levels as well as reduction in total cholesterol, LDL, VLDL, with yoga therapy; In addition to decrease in fasting glucose level and post prandial blood glucose level, Malhotra, *et al* also reported reduction in waist-hip ratio and changes in levels of insulin, which suggests that there is a re-distribution of fat and utilization of glucose. It was also reported by Manjunath S et al that after yogic postures there was higher levels of insulin in young patients. Another study Kosuri M et al showed a significant decrease in BMI and anxiety and an increase in general well-being.<sup>16-19</sup>

Innes et al suggested that yoga may help in improving core problems of the metabolic syndrome like hyperglycemia, and insulin resistance, deranged lipid profiles and anthropometric characteristics. Patients in studies have shown significant improvement in glycemic control and patients were requiring reduced dose of oral hypoglycemics drugs. Among a small number of elderly group patients were followed up to 7 years, there were having good glycemic control and no long-term complications were reported.

## CONCLUSION

In prevention of diabetes in developing countries as well as developed countries, it was noted that programs adapted to their specific needs are lacking. In developed countries due to poor per capita income we should find ways of low-cost strategies for identifying the people at-risk, followed by the implementation of group-based, inexpensive lifestyle interventions, are supposed to be the best options. In developing countries widespread implementation of prevention in patients with type 2 diabetes mellitus will require coordinated efforts throughout the society with comprehensive government policies on prevention and novel funding sources.

Yoga is has been tried for its benefit not only in India bur also in developed countries. In view of the benefits of yoga therapy in short-term studies and long-term studies, more awareness and emphasis should be given for it. Patient should be explained clearly about the beneficial effects of yoga.

Yoga is a collective team work. Through community based demonstration and explanations about yogi and its advantages we can approach large group of patients, and people will benefit from this yoga therapy.

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