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Yoga's Impact on Blood Glucose, Total Cholesterol, Triglycerides and Uric Acid Levels in Male Diabetic Patients

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Abstract

Nowadays, lifestyle associated with stress, sedentary life and unhealthy diet patterns which disturbed glucose homeostasis. This altered glucose homeostasis can lead to chronic hyperglycemia, which can progress to insulin resistance and type 2 diabetes. Many studies shows lifestyle modification in the form of yoga on daily basis help in reducing stress, anxiety and depression. The present study was conducted to assess the effectiveness of yoga on blood glucose, total cholesterol, triglycerides and uric acid levels in male patient of type 2 diabetes mellitus. This study is a prospective randomized control study. Out of 78 patients of diabetes, 38 were in group 1st (control group) and 40 patients were in group 2nd (Study group). The study group was prescribed oral hypoglycemia drugs followed by lifestyle modification in the form of 1h daily practice of yoga for a period of 3 months. The control group was prescribed oral hypoglycemia drugs only. All the results obtained before and after yoga and compared using SPSS 22, The groups' mean±SD was calculated for each study variable and significant difference between means analyzed using the paired and unpaired student "t" test. $p<0.05$ was considered statistically significant. In the current study, mean fasting glucose levels, total cholesterol, triglycerides and uric acid were found to be significantly lower in the yoga-medication study group relative to control group who is only on medication. Yoga, a lifestyle that includes exercise and stress management training, uses integrated approaches to address increased blood glucose, uric acid and lipid levels in diabetic patients.

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Key Words

Yoga practice, diabetic male patients, blood glucose, total cholesterol, triglycerides and uric acid

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INTRODUCTION

Yoga is one of the oldest cultural heritages of India. Yoga is a holistic science of life that originated in India thousands of years ago[1]. Yoga was evolved centuries ago, it is an ancient and perfect art, science and philosophy which takes one towards the innermost trust[2].

India is known as the diabetic capital of the world. Diabetes is affecting approximately 300 million people throughout the world. Diabetes is a syndrome characterized by chronic hyperglycemia and disturbance of carbohydrate, fat and protein metabolism associated with absolute or relative deficiency in insulin secretion and/ or insulin action. It is metabolic syndrome that leads to rise cardiovascular fatality and morbidness when compared to normal community[3,4]. Uric acid is a diprotic acid with pKa1 = 5.4 and pKa2 = 10.3[5]. The uric acid levels are controlled and lowered by insulin, a hormone, which is a produced by the pancreas

Nowadays sedentary life and unhealthy diet patterns which disturbed glucose metabolism lead to chronic hyperglycemia. Stress also affects metabolic control directly by stimulating autonomic nervous system to initiate neuro endocrine stress response that tends to produce hyperglycemia. Several studies shows the effect of exercise in the form of lifestyle modification which improves tissue sensitivity to catecholamine's especially in white adipose tissue, thereby enhancing lipolysis and providing more non-essential fatty acid for utilization by skeletal muscles.

In developing countries, the best options are low-cost strategies to identify risk groups and implementation of inexpensive lifestyle interventions like yoga is the best options[5]. Exercise in the form of yoga is beneficial for diabetic patients .Yogic exercise is a slow, static type of muscular exercise. It can be performed by patients with limited joint movement. It appears to be the earliest and most powerful approach for achieving serenity and mental tranquility. Yoga is known to induce physiological and certain biochemical changes in volunteers[6]. According to a recent review, yoga can reduce stress, enhance metabolic profile, control autonomic nervous system and affect the hypothalamopituitary adrenal axis, all of which are neurological mediators of hyperglycemia[7]. Evidence based clinical studies have recommended training exercises as a cardinal non-pharmacotherapy[8]. The role of yoga asanas and pranayama has been studied in various chronic diseases, such as hypertension, asthma, chronic obstructive pulmonary disease and diabetes[9]. We have taken up this study to evaluate the various parameters like blood glucose, total cholesterol, triglycerides and uric acid before and after yoga in type 2 diabetic subjects.

Aims and Objectives: The aim of present study is to assess the effectiveness of yoga on blood glucose, total cholesterol, triglycerides and uric acid levels in male patient of type 2 diabetes mellitus.

MATERIALS AND METHODS

This study was conducted in the Department of Physiology, Rajshree medical research institute Bareilly (UP), India, for a period of 3 months. Before starting the study ethical committee clearance was taken. In this study initially we had screened 100 male patients randomly of age 40-60 years supported inclusion and exclusion criteria from January 2023-August 2023, but 22 patients were excluded who lost to follow up in subsequent visit. Hence this study was conducted in 78 patients of diabetes mellitus who were either attending outpatient or in patient department or diabetic clinic of Rajshree medical research institute, Bareilly .There were 40 patients in the study group and 38 patients in the control group. A detailed clinical history was taken especially the past history of disease and of medication. The purpose of this research was to study the effect of practicing yoga in male patients with T2DM for 3 months.

Inclusion Criteria and Exclusion Criteria: Type 2 DM without malnutrition or severe complications of the disease (cardiovascular, renal, visual and cerebral), between 40 and 60 years old, duration of the disease between 1 and 5 years, good psychological condition and no any kind of addition.

The study group was prescribed anti diabetic drugs and practiced yoga for one hour everyday for three months at the RMRI Physiology department. The control group was prescribed anti diabetic drugs only and did not perform yogic exercises during this period.

After taking informed consent from all the patients, it is advised to come fasting overnight and 5ml blood samples were withdrawn from each patient under all aseptic precaution. Blood was collected in a plain bulb for triglycerides (TG), total cholesterol (TC), uric acid and fluoride bulb for FBS level. All laboratory determinants were conducted out in our Institute's Biochemistry Department. The study program consisted of 1h yoga practice session for 6 days a week for the duration of 3 month

Before starting the study, study group was taught a series of yoga postures in groups of 20 patients each. They were instructed to practice them daily for 1h duration and were asked to record the number of minutes they engaged in yoga per day. Yoga treatment consisted of practice of 1) asanas (Body postures), 2) Pranayama (Breathing exercises) and 3) meditation techniques to be practiced for 1 h duration. After two weeks of supervised yoga training, participants received medical advice and a personalized yoga

Table 1: Comparison of biochemical parameters in the control and study groups at baseline and after 3 months of yoga therapy

Parameters	Control group (n = 38)			Study group (n = 40)		
	Baseline	After 3 months	p-value	Baseline	After 3 months	p-value
Blood sugar (F) (mg/dl)	152.80±28	148.22±26	0.4561	148.10±10	131.36±23	0.0001
Total Cholesterol (mg/dl)	188±50	183±48	0.654	209±42	153±33	0.0001
Triglycerides (mg/dl)	151±76	147±53	0.787	182±55	125±32	0.0001
Uric Acid (in mg/dl)	5.80±0.20	5.81±0.11	0.784	5.79±0.24	5.62±0.25	0.0031

Significant at p<0.05 and highly significant at p<0.001

program to practice at home. All subjects were required to contact the physiology department once every month for follow up advice.

The control group was asked to come to the diabetes clinic for a monthly follow-up after being advised about the treatment at the beginning of the study. There were no changes in the treatment and eating habits of both groups during the study period. Both groups were advised to continue a low -carbohydrate, high-fiber diet. Mean±SD of groups was calculated for each study variable and significant difference between means was assessed using paired and unpaired Student's "t" Test. Statistical Package for Social Science (SPSS) version 22.0 software for windows was used, with p<0.05 considered as statistically significant.

RESULTS AND DISCUSSIONS

Out of initial 100 participants, 22 volunteers did not complete the yoga practice for three months and were therefore excluded from the final analysis.

Three months of yoga therapy resulted in a highly significant decrease in all biological parameter.

The reduction in mean values of FBS at the end of three months was highly significant (p<0.001) in the study groups when compared to control group.

The comparison of lipid profile in control group i.e. TG decreased from 151±76-147±53mg/dl and total cholesterol from 188±50-183±48mg/dl which was statistically not significant. While in study group TG decreased from 182±55-125±32mg/dl and total cholesterol from 209±42-153±33mg/dl, was found statistically significant. The comparison of uric acid level in control group i.e. from 5.80±0.20-5.81±0.20 which was statistically not significant while study group from 5.79±0.24-5.62±0.25 was statistically significant.

In the present study, there was a highly significant reduction in total cholesterol, triglyceride concentration, fasting blood sugar and uric acid level in the study group when compared with the control group after 3 months of yoga therapy.

Environmental factors, psychosocial factors and stress play an important role in the development of T2DM in genetically susceptible individuals. The incidence of T2DM increases with age, physical inactivity and a sedentary lifestyle[10]. Diabetes, which is a chronic metabolic disease, negatively affects the quality of life. Numerous medicines for diabetic patients are being produced and marketed to control blood glucose levels. However, when used for a long time, the use of such drugs has its own risks, such as substance dependence, drug tolerance and adverse effects. Hence, in recently there has been an intense search for non-medical measures not only to control DM, but also to prevent its complications[11,12]. Exercise is an important therapeutic modality that involves the treatment of diabetes mellitus[13]. The different postures performed during yoga practice help to improve the sensitivity of ß-cells to glucose., it improves secretion and increases muscle blood flow and muscle relaxation, which improves glucose. Pro inflammatory responses are reduced and improved by yoga therapy resulting in immune modulation[14].

In our study, there is significantly reduced the total cholesterol, triglycerides and uric acid in study group. The present findings of the result is in line with the findings of Prasad *et al.*[15] and Sayyed *et al.*[16] and also in uric acid level which was also supported by the findings of Dugarte[17] and Poortmanx and Vanderstraenten[18].

In the present study, the significant decrease in FBS level after yoga in both groups indicates potential role of yoga in preventive and management strategies for T2DM. Gordon *et al*. suggested that "The positive effects of yoga on blood glucose levels are consistent with the results of the present study. The explanation for this consistency between these studies can be explained by the mechanism that activates the pancreas gland through muscle contraction and relaxation in yogic postures during yogic exercises so that relaxation, deep breathing, bending and twists and turns of the spine where the pancreas is located directly stimulate pancreatic beta cells"[19]. Sahay reported that "Significant reduction in fasting and postprandial blood glucose (PPBG) within 3 months of yoga exercises in T2DM. The beneficial effect of T2DM yoga has been due to improved insulin sensitivity in the target tissues, which reduces insulin resistance and thereby improves the peripheral usage of glucose"[20]. After reviewing the results of this study, it can be mentioned that our findings were consistent with the results of Singh *et al*.[21].

Yoga can rejuvenate or regenerate beta cells of pancreas[22]. In addition, yoga has positive effect on general well-being and stresses[23]. Hence, in the view of complexities of treatment plans for control of

T2DM, yoga can be considered as cost-effective and non-invasive adjuvant therapy. In addition to reducing the dose of oral hypoglycemic drugs/insulin, yoga can also slow the progression of the disease process.

CONCLUSION

Yoga is a type of art and exercise that is performed to strengthen the mind and body. It is considered that yoga that physically affects flexibility and balance, as well as positive changes in the mind, has a positive effect on improving physical performance when it is practiced regularly. From the results of the study that yoga practice has bring positive changes in biochemical parameters and it was due to the performance of various asana postures.

It can be concluded that yoga can be used as an alternative to medical therapy. Yoga therapy also improves the condition of diabetics by reducing insulin dosage, physical and mental vitality and prevention of complications. Yogic practice, therefore, plays a role in the prevention of DM, both primary and secondary. Yoga therapy can also be considered a useful adjunct in the treatment of T2DM.

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