Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2015; 3(5A):1876-1879 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublisher.com

Research Article

Effects of 10 Weeks Yoga Training on Blood Glucose and Lipid Profile in Type II Diabetic Patients.

Balaji P.V[1*], Thirumaran M[2]

[1]Balaji P.V, Associate professor, Department of Physiology, Vinayaka Mission Medical college, Karaikal-609609
[2]Thirumaran M, Associate professor, Department of Physiology, Vinayaka Mission Medical college, Karaikal-609609

***Corresponding author**
Balaji PV
Email: sagu.rakesh@gmail.com

Abstract: Diabetes mellitus (DM) is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period. Diabetes is due to either the pancreas not producing enough insulin or the cells of the body not responding properly to the insulin produced. Prevention and treatment involve a healthy diet, physical exercise, not using tobacco and being a weight. The aim of the study is to assess the fasting blood glucose level and lipid profile in diabetes mellitus patients in comparison with controls after 10 weeks of yoga training. In this experimental study, 30 patients with type II diabetes of age group between 45 to 60 years old were randomly selected and divided into two (n= 15) groups of experimental and control. Experimental group were subjected to regular yoga training for 10 weeks (6 sessions per week, 60 minutes per session), while the control group did not have any regular activity. The dependent variables were total cholesterol (TC), triglycerides(TG), LDL (low density lipoprotein), HDL (high density lipoprotein), and fasting blood glucose. Results indicated a significant difference in the changed levels of total cholesterol, triglycerides, LDL, HDL, and blood glucose between the control and experimental groups ($P \leq 0.05$).
Keywords: yoga training , Lipid profile, Fasting blood glucose level.

INTRODUCTION

Diabetes mellitus is a disease caused by deficiency or diminished effectiveness of endogenous insulin. It is characterized by hyperglycemia, deranged metabolism and sequelae predominantly affecting the vasculature[1]. The main types of diabetes mellitus are Type 1 diabetes mellitus: results from the body's failure to produce sufficient insulin. Type 2 diabetes mellitus: results from resistance to the insulin, often initially with normal or increased levels of circulating insulin[2]. Glucose in the bloodstream stimulates the pancreas to produce insulin . Insulin allows glucose to move from the blood into the cells. Once inside the cells, glucose is converted to energy, which is used immediately, or the glucose is stored as fat or glycogen until it is needed[3]. The levels of glucose in the blood vary normally throughout the day. They rise after a meal and return to normal within about 2 hours after eating. Once the levels of glucose in the blood return to normal, insulin production decreases. The variation in blood glucose levels is usually within a narrow range, about 70 to 110 milligrams per deciliter (mg/dL) of blood in healthy people[4]. One of the biggest health problems of this century, which is also the major risk factors in patients with diabetes, is the prevalence of obesity. Nowadays, 1.1 billion adults worldwide have excessive body fat and 313million of them are obese. Several studies have reported the prevalence of abdominal obesity in people with diabetes [5]. Per 1 kilogram of body weight, the risk of diabetes increases by almost 5 percent. It is estimated that, prevention of obesity in adults approximately prevents half of the cases of type II diabetes. It seems that, overweight and obesity are the main causes of the development and progression of diabetes in 60 to 90 percent of people[6]. With the increase in body fat, especially fat around the abdomen, muscle cells and other tissues of the body become resistant to insulin and inhibit glucose entry into muscle cells, hence, glucose accumulates in the blood and blood sugar goes up [7]. There are strong evidences that, controlling weight in obese patients reduces risk factors for diabetes. Several factors increase the risk of cardiovascular complications in these patients. The most common causes are elevated triglyceride levels, reduced HDL, increasing LDL, weight gain, obesity and high blood pressure [8]. The incidence of coronary artery disease in patients with diabetes is about 2 to 4 times higher than no diabetics [9]. The benefits of physical activity in patients with type II diabetes is considerable and recent studies have considered the importance of long-term exercise programs focused on prevention and treatment of common metabolic problems. To improve glycemic control and reducing weight and cardiovascular diseases, it is recommended

to perform aerobic exercise at least 150 minutes per week of moderate-intensity between 40 to 60 percent of maximum oxygen consumption or 50 to 70 percent of maximum heart rate for at least 90 minutes of vigorous aerobic exercise [10]. Regular activities in diabetic people remove severe insulin reaction, since the more stored glycogen in muscle and liver increases peripheral and visceral insulin sensitivity in patients with type II diabetes [11]. Some findings suggest that, reducing adipose tissue in these patients can decreased insulin resistance, reducing weight is as one of the most important advices for the treatment of type II diabetes [12]. Because type II diabetes is more common among older people, and many of these individuals are also faced with problems of joint and muscle pain, doing exercises is an exhausting action for them and they lack the desire to high intensity aerobic exercises [13].

MATERIALS AND METHODS

The applied research with test and control groups and using pre-test and post-test. Statistical population for this study included all men and women with type II diabetes who visiting the private diabetes clinic of karikal district .30 patients were randomly selected and randomly divided into two 15-member groups of test and control. In order to investigate the serum fat (Cholesterol, triglycerides, HDL - LDL) and blood sugar, blood samples of patients after 8 to 12 hours of fasting were used. For this purpose, they were asked visit the lab 24 hours before and after the exercises.

Yoga session: Training program that was used in this study consists of a series of yoga exercises 6times a week (1 hour) for 3months (10 weeks). Yoga exercises are performed continuously in this period. Depending on the class, breathing exercises and meditation sessions were conducted in first 10 minutes and the remaining 35 minutes spent for asanas .The asanas can be performed in any place but they should be done with an empty stomach. Some of the common asanas performed in different postures are as follows- 1.Vrikshasana 2.Trikonasana 3.Suryanamaskara 4.Vajrasana 5. Baddhakonasana 6.Shashankasana 7.Parvatasana. 8. Bhujangasana 9.Dhanurasana 10.Makarasana.The Sudarshankriya Yoga (SKY) is a rhythmical cyclical breathing done in vajrasana posture with eyes closed & breathing through nostrils. It is taught by a trained & certified instructor as a 20 -22 hours program & is typically five to six sessions of two and half or three hours. [14]The student paired t test was used for the comparison between the test and control groups to determine significant differences between groups in pre-test and post-test. The level of significance was considered equal to ($P \leq 0.05$).

RESULTS

A total of 30 patients were studied in this study (N = 15 per group). Differences in examined variables of each group are shown in Table 1. As the table shows, there were significant differences in the mean of total cholesterol (TC), triglycerides (TG), LDL, HDL and blood glucose level between groups after ten weeks of yoga.

Table-1: Effect of ten weeks of yoga on total cholesterol (TC), triglycerides (TG), LDL, HDL and blood glucose level in Type-II diabetics

Variables	Yoga group		Control group		P value
	Pre test	post test	Pre test	post test	
TC(mg/dl)	162.2±22.46	156.2±22.21	166.78±34.44	168.4±34.34	0.001*
TG(mg/dl)	175.93±22.46	122.1±22.21	150.06±31.58	151.73±28.60	0.003*
LDL(mg/dl)	98.06±14.73	84.73±16.95	117.22±20.93	116.66±20.05	0.001*
HDL(mg/dl)	40.53±4.48	49.73±5.54	93±4.49	89.2±7.18	0.001*
FBG	178.89±15.76	134.24±7.87	137.98±4.89	138.78±5.98	0.001*

**Significant differences from pre to posttest between groups ($p \leq 0.05$)*

TC(mg/dl), TG(mg/dl),LDL(mg/dl),FBG was found to be decreased in yoga group when compared to control group. HDL(mg/dl) was found to be increased in yoga group when compared to control group.

DISCUSSION

Fat metabolism is altered in patients with diabetes, because the increase in blood glucose and lack of strict control increases blood fat, i.e. the cause is hyperglycemia and the effect is elevated blood fats [14]. When the blood sugar is high, the blood triglycerides will be increased and the HDL will be reduced as well as slightly increase in LDL and total cholesterol in the blood. Due to the low insulin secretion in diabetic patients which cannot be improved with medications, triglyceride uptake in adipose tissue is impaired and from the other hand, the LDL uptake will be decreased in liver cells. Increased triglycerides and decreased HDL will eventually lead tithe lack of insulin and the remained triglycerides will be stored in fat tissues [15]. HDL will be decreased through complex mechanisms. In cases where there is insulin but the body is affected by insulin resistance, increased triglycerides and decreased HDL, the LDL inside lining of arteries will be increased, causing atherosclerosis and increased severity and progression of the disease over the time

One of the problems faced by many patients with type II diabetes is obesity and a sedentary lifestyle also adds to the cause. Obesity, by increasing the level of triglycerides, increases the LDL[16]. In this study it seems that, yoga exercises have used glucose as energy substrate and the oxidation have generally declined. As mentioned, there is a strong relationship between insulin resistance and intramuscular triacyl glycerol content. This may be due to an increase in blood flow, skeletal muscle blood vessels, increase of Triacyl glycero llipolysis in adipose tissue and transport of fatty acids from the blood to muscle sarcoplasm which is due to the use off at during exercise[17]. It seems that, physical activity reduces lipoprotein lipase enzyme (LPL), digestible levels of blood fats (LDL - VLDL - TG and cholesterol). LPL may have the most important role in reducing insulin resistance during exercise [18]. People with low TG concentrations showed little change with exercise, whereas plasma triacyl glycerol of people with high concentration considerably decreases. There are plenty of evidences indicating that, yoga trainings are more effective in reducing the triglyceride of people with high cholesterol than those with lower cholesterol. Therefore, the initial conditions of patients are very important [19]. Based on these findings it can be concluded that, the mechanism of changes in plasma lipids after exercise is due to change in resistance to insulin. It also seems that, to get most of the benefits of improved blood lipid levels, moderate to high intensity trainings are required[20]. In addition, based on the results of the study, in comparison with control group, yoga significantly decreases the blood glucose ($P \leq 0.05$).

CONCLUSION

The results of the present work indicate that, 10-weeks yoga training has positive effects on total cholesterol, triglycerides, LDL and HDL in patients with type II diabetes. However, the mechanisms involved in these changes have not been fully characterized. According to the conducted studies, we can conclude that, regular yoga exercise can have a positive impact on reducing the complications of diabetes and improve the quality of life for diabetic patients and may prevent disease progression. In some cases, it may also reduce the need for medications.

REFERENCES

1. Taskinen MR; Diabetic dyslipidemia. Atheroscler Suppl, 2002; 3(1):47–51.
2. Mooradian Arshag D; Dyslipidemia in type 2 diabetes mellitus. Nat Clin Pract Endocrinol Metab, 2009; 5:150–159.
3. Ford ES, Mokdad AH, Giles WH, Mensah GA; Serum total cholesterol concentrations and awareness, treatment, and control of hypercholesterolemia among US adults: findings from the National Health and Nutrition Examination Survey, 1999 to 2000. Circulation, 2003; 107:2185–2189.
4. Imperatore G, Cadwell BL, Geiss L; Thirty year trends in cardiovascular risk factor levels among US adults with diabetes: National Health and Nutrition Examination Surveys, 1971–2000. Am J Epidemiol, 2004; 160: 531–539.
5. Krauss RM; Dietary and genetic probes of atherogenic dyslipidemia. Arterioscler Thromb Vasc Biol. 2005; 25:2265–2272.
6. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults Executive summary of the third report of the National cholesterol education program (NCEP) expert Panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult treatment Panel III) JAMA. 2001; 285: 2486–2497.
7. Mahajan AS, Reddy KS, Sachdeva U; Lipid profile of coronary risk subjects following yogic lifestyle intervention. Indian Heart J, 1999; 51: 37–40.
8. Damodaran A, Malathi A, Patil N, Shah N, Suryananshi, Marathe S; Therapeutic potential of yoga practices in modifying cardiovascular risk profile in middle aged men and women. J Assoc Physicians India, 2002; 50: 633–640.
9. Vyas R., Dikshit N; Effect of meditation on respiratory system, cardiovascular system and lipid profile. Ind J Physiol Pharmacol, 2002; 46(4): 487–491.
10. National Diabetes Data Group Classification and diagnosis of diabetes mellitus and other categories of glucose intolerance. Diabetes, 1979; 28:1039–1057
11. Vedamurthachar A, Bijoor A R, Agte V, Reddy S, Lakshmi B; Short term effect of Sudarshan Kriya yoga on lipid and hormone profile of type 2 diabetic patients. Research Journal of Chemical Science, 2011; 1(9): 83-86.2.
12. Madan M, Pal GK; Effects of Yoga Training on Cardio-respiratory functions of school Children of Pondichery. Dissertation submitted to Deptof Physiology JIPMER ondichery, 2002: 3.
13. Park K; Park's Textbook of Preventive and Social Med.18thedition.Banarsidas Banot Publishers, Jabalpur, India.2005; 311-15.
14. Singh S, Malhotra V, Singh KP, Sharma SB ,Madhu SV , Tandon OP *et al.* ; A preliminary report on the role of yoga asanas on oxidative stress in non-insulin dependent diabetes mellitus .Ind J Clin Biochem, 2001;16:216-220.
15. Mahapuri HH, Shete SU, Bera TK; Effect ofyogic exercise on superoxide dismutase levels in diabetics. IJ of Yoga, 2008; 1:21-26.
16. Jain SC, Talukdar B; Role of yoga incontrol of hyperglycemia in middle aged patients of non insulin dependent diabetes mellitus. Indian J Clin. Biochem, 1995; 10 2: 62-65.
17. Aljasir B; Yoga practice for the managementof type 2 diabetes mellitus in adults: a ystematic review. Evidence based complement alternate Med, 2008; 7:399.

18. Uppal A, Bhatnagar SO, Talukdar BA; studyn of response pattern of non insulin dependent diabetes to yoga therapy .Diabetes Res Clin Pract, 1993; 19(1):69-74.
19. Bijlani RL, Vempati RP, Yadav RK, Ray KB, Gupta V. Sharma, *et al*.; A brief but comprehensive lifestyle education program based on yoga reduces risk factors for cardiovascular disease and diabetes mellitus. J Altern Complementy Med, 2005; 11(2); 267-74.
20. Monro R, Power J, Coumar A, Dandona P; Yoga therapy for NIDDM: a controlled trial complementary Medicine. Research, 1992:66-68.