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Original Research Article

Effect of Yogic Exercise on Lipid Profile of Patients of Diabetes Mellitus Type Ii and Its Correlation with Addiction and Family History

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ABSTRACT

Background:
Diabetes is the fifth leading cause of death in the U.S. One hundred million persons have history of diabetes worldwide. Diabetes also contributes to higher rates of morbidity- people with diabetes are at higher risk for heart disease. Lipid profile estimation and its control can predict the future macro and micro vascular complication in these patients.
Aim & Objective:
To study the effect of six month of Pranayama training on lipid profile and its relation with addiction and family history in patients of diabetes mellitus type2.
Materials& Methods:
The present study was carried out in the Department of Physiology, NSCB Medical College, Jabalpur. The Study comprised of 50 known Diabetic patients aged 35-65 years. The study population was subjected to practice "YOGA', Anulom-vilomand Kapalbhati Pranayama15 minute each daily for a total period of six months under observation of a yoga instructor. The effect of yoga practice on various parameters were recorded and statistically analyzed.
Observations and results:
Patients have not shown any significant change in lipid profile after 6 months of Yoga practice as compared to their values at first visit. Though the patients with any kind of addiction were having higher values than that of without addiction and family history of diabetes but the difference was statistically not significant.
Summary and Conclusions:
Yoga practice can be an adjuvant to delay the complications associated with the dyslipidemia in diabetic patients but this cannot be used as single measure to prevent all complications.

Key words: Yoga, Diabetes, Pranayam, Dyslipidemia, HDL, LDL, Cholesterol

INTRODUCTION

Diabetes is the most common non-communicable disease globally. The estimated number of adults with diabetes in 2007 was 246 million, of these 80% live in developing countries, the largest numbers on

the Indian subcontinent and in China. India has 41 million diabetics and this number is expected to increase to 70 million by 2025. [1]

Approximately, by 2030, 438 million people (7.8%) of the adult population, is expected to have diabetes. [2,5] Estimated global healthcare expenditures to treat and prevent diabetes and its complications are expected to be USD490 billion by 2030. [2]

India, a country experiencing rapid socioeconomic progress and urbanization, carries a considerable share of the global diabetes burden. Studies in different parts of India have demonstrated an escalating prevalence of diabetes not only in urban populations, but also in rural populations as a result of the urbanization of lifestyle parameters. The prevalence of prediabetes is also high. Prevalence of diabetes among adults has reached approximately 20% in urban populations and approximately 10% in rural populations. It is estimated that, by 2030, nearly 46% of Indian population will be living in urban areas. Chronic diseases, such as diabetes and cardiovascular disease (CVD), pose a primary challenge for the health care system. [1]

The most common and serious effect of diabetes in adults is cardiovascular disease (CVD). [3,4] Patients with diabetes have 2-4 fold higher risk of myocardial infarction and stroke and 3-4 times more likely to die of coronary heart disease than individuals without diabetes. In spite of rigorous effects to maintain healthy life style patients fail to improve dyslipidemia associated with insulin resistance, high triglycerides and low high density lipid levels. [3]

Diabetes can now be controlled through improved medical care, monitoring, and lifestyle changes. The burgeoning epidemic of type 2 diabetes mellitus is now receiving increasing attention because of its human and fiscal costs and the disability and death associated with the disease. [4]

The most common alteration of lipoprotein in type II diabetes mellitus is hypertriglyceridemia caused by elevation in VLDL concentration. In Type 2 DM with severe hyperglycemia the clearance rate of LDL Apo-B is reduced. HDL in type II DM is usually decreased due to increased rate of HDL clearance as measured by Apo-A1 and Apo A2 kinetics. [5,6]

Dyslipidemia is a common co-morbidity in T2DM patients. According to the Center for Disease Control and Prevention (CDC), 70% to 97% of T2DM adults have one or more lipid abnormalities. Dyslipidemia in T2DM is associated with an increased flux of free fatty acid release from insulin-resistant fat cells to the liver. Consequently, the deposition of lipid in blood vessels causes atherosclerotic lesions which later lead to cardiovascular disease (CVD). [6]

There is clear association among Diabetes, dyslipidemia and coronary heart disease as a complication which increase the mortality and morbidity in the patients. Many drug therapy, life style modification and alternative therapies are used to reduce the factors leading to the complications in diabetic patients.

Recently much attention has been paid to Yogic exercises to reduce the complication associated with Diabetes mellitus type 2. In this study an attempt has been made to observe the change in the lipid profile following 6 month of yogic exercises in patients of Diabetes mellitus type 2. We have also evaluated its relation with the addiction and family history. The objective of the current study was to evaluate the perceived benefits of yoga in a group of patients suffering from diabetes mellitus type II participating in a gentle 6 months of yoga program.

MATERIALS AND METHODS

The present study "Effect of Yogic exercise on lipid profile of patients of Diabetes mellitus type 2 and its correlation with addiction and family history." was carried out in the Department of Physiology, NSCB Medical College Jabalpur from December 2006 to December 2008.The study was conducted on 50 patients suffering from diabetes mellitus type-II between the age group of 35-65 years, for the period of six month. The subjects were introduced to a pretested questionnaire for assessing the nutritional status, health status, type of medication, family history and duration of disease of the study population. A complete general and systemic examination was carried out including relevant anthropometric measurements such as height, weight, body mass index.

Informed consent was taken from patients who had done yoga; Anulomvilom Pranayam and Kapalbhati for a period of 6 months for minimum of 15 minutes daily under observation of a yoga instructor. Subjects having history of complications associated with diabetes or suffering from any other disease and subjects less than 30 years were excluded from the study. All the parameters were evaluated using semiautoanalyzer (MA02454, NOVA, USA) in the central lab.

Statistical analysis was done using SPSS software ver. 15. 't' test was used to compare the findings before and after yogic exercise. Results were expressed as Mean± SD with help of suitable diagrams and tables.

RESULTS

The age group comprised of 35-65 years of age and their relative numbers divided in age group interval of 10 yrs. Maximum patients is of 45-55 years of age group.

53.57% of total patients were not having history of any kind of addiction while in rest of the patients the addiction of alcoholism (7.14%), tobacco chewing (10.71%), smoking (10.71%) were present. 17.85% patients were having multiple addictions.60.7% patients were having family history of diabetes while 39.3% patients were not having family history of diabetes.

The changes in parameters of lipid profile have been shown in table-1.

Table-1: Lipid profile before and after 6 months of yogic exercise in patients.

S.No.	Parameters	At first visit (Mean±SD)	After 6 months of Yoga practice (Mean±SD)	p value
1	Total Cholesterol(mg %)	192.9±27.33	184.25±22.88	≥0.05
2	LDL-C (mg %)	118.9±16.2	115.62±13.38	≥0.05
3	HDL-C (mg %)	43.53±5.99	43.45±5.93	≥0.05
4	Triglyceride (mg %)	151.7±52.3	145.67±39.82	≥0.05
5	Serum Cholesterol/HDL Ratio	4.53±1.039	4.341±0.960	≥0.05

Total cholesterol, LDL-C and triglyceride level decreased after 6 month of yogic exercise but the change was not statistically significant. HDL-C and serum Cholesterol/HDL ratio have not shown any significant change.

The values of lipid profile in patients with history of addiction and without addiction after 6 months of yoga have been shown in Table-2.

The values of lipid profile in patients with family history of diabetes and without diabetes after 6 months of yoga have been shown in Table-3.

Table-2: Lipid profile after 6 months of yogic exercise in patients with and without addiction.

S.No.	Parameters	Patients with addiction (Mean±SD)	Patients without addiction (Mean±SD)
1	TotalCholesterol(mg%)	189.00±23.88	180.133±21.951
2	LDL-C (mg %)	120.469±13.26	111.423±12.422
3	HDL-C (mg %)	42.425±5.28	44.344±6.487
4	Triglyceride (mg %)	154.269 ±39.51	138.220±39.911
5	Serum Cholesterol/HDL Ratio	4.608±0.97	4.169±0.99

Table-3 Lipid profile in patients with family history of diabetes and without diabetes

S.No.	Parameters	Patients with positive family history (Mean±SD)	Patients without family history (Mean±SD)
1	TotalCholesterol (mg %)	181.412±22.798	189.818±22.943
2	LDL-C (mg %)	112.411±13.334	120.588±12.445
3	HDL-C (mg %)	43.369±5.999	43.583±6.113
4	Triglyceride (mg %)	141.612±40.293	151.945±40.174
5	Serum Cholesterol/HDL Ratio	4.300±0.902	4.485±1.129

DISCUSSION

Diabetes mellitus is a metabolic disorder, where not only blood sugar but various other metabolic abnormalities are including dyslipidemia.

Yoga is an ancient Indian practice that dates back hundreds of years. It was designed as a path to spiritual enlightenment, but in present era, the physical aspects of yoga have found huge popularity as an alternate form of exercise and stress management. There are different types of yoga, but each one essentially relies on structured asanas practiced with control on breathing. There are well documented effects of yoga on cardiovascular, nervous, digestive and musculoskeletal system. The ultimate benefit of yoga is that it is competitive and suitable for every age group.

In the present study an attempt was made to evaluate the beneficial effects of Pranayama on Lipid profile of Diabetic patients. The present study has been conducted in the Department of Physiology, NSCB Medical College, Jabalpur. The Study comprised of 50known Diabetic patients aged 35-65 years. The study population was subjected to practice "YOGA', Anulomvilom, Pranayam and Kapalbhati15 minute each daily for a total period of six month under observation of a yoga instructor.

In present study the parameters were taken once at the time of recruitment and second at the end of 6month. In all the parameters except HDL there were decrease from their initial value after 6 months of yoga though the decrease in the values was not statistically significant. There was no noticeable decrease in serum triglyceride, LDL, VLDL, cholesterol and no noticeable increase in HDL. Serum cholesterol, serum Triglyceride, LDL-C Level and Cholesterol/HDL Ratio is also decreased as compared to initial value from192.9±27.33 to 184.25±22.88, 151.7±52.3 to 145.67±39.82, 118.9±16.2 to 115.62±13.38 and from 4.53±1.039 to 4.341±0.960 respectively but they were not statistically significant (P≥0.05). The serum HDL level (43.53±5.99 to 43.45±5.93) has also shown no significant increase.

The change in lipid profile seen in this study is similar with the earlier studies of Vedamurthachar et al. [7] They studied Short Term Effect of Yoga on lipid and hormone Profile on 50 type 2diabeticpatients. In the participants, there was a significant decrease in plasma cholesterol (p≤0.03), increase in HDL

($p \leq 0.0001$), but levels of triglycerides, LDL and VLDL remained unaffected ($p \geq 0.05$).

In another study Balaji et al [8] studied the effect of yoga - pranayama practices on metabolic parameters in type 2 diabetes. They reported significant decrease in *triglycerides* (170 + 70.55 to 132.2 + 60) and *LDL* (108 + 36.24to 98 + 33.2), however, no significant change in HDL levels was observed.

Malhotra et al [9] also reported a significant reduction in free fatty acids, LDL, VLDL and an increase in HDL in 34 known diabetic patients after performing yoga for 40 days. Many other studies [10-12] also reported changes in one or two lipid profile parameters but not overall improvement in all the parameters.

No significant change was observed in lipid profile in subject with addiction though the dyslipidemia was more pronounced in subject with addiction. Serum Cholesterol, HDL, LDL-C, Triglyceride and Serum Cholesterol/HDL Ratio level in subject with positive family history were 181.412±22.798, 43.369±5.999, 112.411±13.334, 141.612±40.293 and 4.300±0.902. SerumCholesterol, HDL, LDL-C, Triglyceride and Serum Cholesterol/HDL Ratio level in subjects with negative family history were 189.818±22.9, 43.583±6.113, 120.588±12.445, 151.945±40.174 and 4.485±1.129. No significant change of yoga was observed in patient with positive or negative family history. This may be interpreted that family history has no significant relationship in improvement in dyslipidemia in diabetic patient performing yoga for short duration.

Yoga-based therapy is clearly a promising intervention for primary and secondary prevention of diabetes, given the multiple health benefits attributed to the practice of yoga. However, the literature is unclear regarding the most beneficial forms of yoga, the possibility of a dose–response relationship in managing diabetes, and the most labor-effective, cost-effective, and time-effective manner in which to train patients. [13]

The dynamic stretching of the body during yoga asanas is postulated to rejuvenate pancreatic cells, increase insulin secretion and hence correct the impaired insulin secretion in chronic diabetes. [10]

The beneficial effect of yoga in the management of hyperlipidemia and obesity cannot just be attributed alone to the simple excess calorie expenditure as there is no rapid muscle activity and energy generation involved in yoga. [14] Repeated stress is known to lead to persistent elevation of cortisol which causes central obesity and insulin resistance. It increases gluconeogenesis and diminishes peripheral uptake of glucose. [15] Elevated cortisol is also linked to dyslipidemia, and higher blood pressure. [16]

Sympathetic nervous system overactivity in the form of profound hyperglycemia in response to epinephrine along with high levels of endogenous opioid peptides is also found to be an etiological factor in type II diabetes. [17]

Yogic Postures are now, one of the non-pharmacological therapies against stress and strain. Yoga practice has been shown to be effective in improving stress depression, blood level of cortisol with decrease in sympathetic activity. [18]

The autonomic nervous system plays a major role in bringing about adaptation of human body to environmental changes, thereby modulating the sensory, visceral, motor and neuroendocrine functions regulate the activity of all muscles and certain glands. Autonomic nervous system is one of the most important mediators of this response and these changes may be responsible for the present findings. [19]

Dyslipidemia is usually associated with the abnormalities in lipolysis; triglyceride metabolism and free fatty acid turn over in a case of insulin resistance. Impaired lipoprotein lipase and increased hepatic lipase activity is thought be a resulting from insulin resistance in diabetes. Chronic exposure to elevated free fatty acids has been associated with impaired insulin secretion. The improvement in lipid profile with practice of yoga could be due to increased hepatic lipase and lipoprotein lipase. This would increase the uptake of triglycerides by adipose tissue and affect the lipoprotein metabolism. Better ability to overcome stress resulting in lowered cortisol levels can be cited as possible mechanism for improvement in lipid profile in patients practicing yoga. [14]

This study relied on a study design with no control group; although the completion of yoga was encouraged, the possibility of error in practice was there. Future studies may benefit from a protocol that includes systematic recording of participant comments and a face-to-face exit interview for those who prefer verbal communication to record other health related parameters. Data were collected over a6 months' time period, reflecting short-term benefits of yoga. Several participants did not express confidence with yoga until 5-6weeks of the intervention period; a longer intervention may have yielded greater benefit. To advance understanding of the short- and long-term benefits of yoga, a longitudinal study design including a longer intervention period, comprehensive evaluation, and a long term follow-up is needed.

CONCLUSIONS

There was no evidence in the current study that 6 month yoga intervention in diabetic patients led to decrease level of dyslipidemia over time. In our study though the lipid parameters were found to be decreased as compared to patients' lipid profile at their first visit but none of the parameters have reached to significant level. Similarly no clear cut associations have been observed among addiction, family history and reduction in dyslipidemia after yoga practice. Further studies are required with larger cohort, including all type of diabetes and all age group with strict control on confounding factors.

Further research is also necessary to determine the long-term effect of yoga practice on lipid profile among individuals with or at risk for type II diabetes to clarify the influence of yoga on a variety of behavioral health outcomes associated with type II diabetes.

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