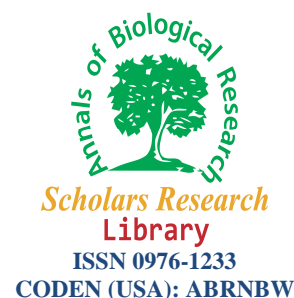




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Effects of yogic practice on lipid profile in elderly women with Type 2 Diabetes Mellitus

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ABSTRACT

This work has been conducted to examine the impact of 12 weeks of yogic intervention on lipid profile in elderly women with type 2 diabetes mellitus. In this study, 20 women with type II diabetes and between 50 to 70 years old were recruited from two old age home and randomly divided into two (n= 10) groups of experimental and control. Experimental group were subjected to regular yoga practice for 12 weeks (3 sessions per week, 45 minutes per session), while the control group did not have any regular activity. The dependent variables were total cholesterol, triglycerides, low density lipoprotein, very low density lipoprotein and high density lipoprotein and were examined before and after 12 weeks of yogic intervention in both groups. Results indicated a significant ($P \leq 0.05$) decrease in total cholesterol, triglycerides, low density lipoprotein and very low density lipoprotein; with a significant ($P \leq 0.05$) increase in high density lipoprotein level from its initial value; while showing insignificant result in active control group. Based on our results, it can be said that, yoga is a non-drug, non-invasive and cost-effective method to improve the quality of life. Consequently, it is suggested that yoga may be used as an adjunct to reduce type 2 diabetes mellitus of elder women.

Keywords: yoga, type II diabetes, lipid profile

INTRODUCTION

The prevalence of diabetes is rapidly rising all over the globe at an alarming rate [1]. Over the past 30 yr, the status of diabetes has changed from being considered as a mild disorder of the elderly to one of the major causes of morbidity and mortality affecting the youth and middle aged people. According to recent estimates, approximately 285 million people worldwide (6.6%) in the 20-79 year age group was diabetes in 2010 and by 2030, 438 million people (7.8%) of the adult population, is expected to have diabetes [2]. Similarly, for India this increase is estimated from 51 million people in 2010 to 87 million in 2030 [3]. India has more diabetics than any other country in the world, according to the International Diabetes Foundation. Keeping in view the alarming increase in the incidence and prevalence of diabetics in India, WHO has declared India as the- Diabetic Capital of the World [4].

The major risk factor for coronary artery disease (CAD) in diabetes mellitus is dyslipidemia [5]. The characteristic features of diabetic dyslipidemia are a high plasma triglyceride concentration, low high-density lipoprotein (HDL) concentration and increased concentration of small dense low-density lipoprotein (LDL) particles. Insulin resistance leads to increased flux of free fatty acids and hence the lipid changes [6]. Coronary artery disease is the most important cause of death and disability among older women [7]. By the year 2015, cardiovascular mortality is likely to rise to 90% in females in India [8]. High circulating serum cholesterol, low-density lipoprotein-cholesterol (LDL-C) and serum triglycerides are major risk factors of this disease [8,9]. The modification of lipid profile may be important both in the prevention and control of coronary heart disease [9]. Behavioural methods are recommended by the National Cholesterol Education Programme as the first line of prevention and treatment for hypercholesterolemia and other risk factors [10].

Yoga is a practical discipline incorporating a wide variety of practices whose goal is the development of a state of mental and physical health, well-being, inner harmony and ultimately “a union of the human individual with the universal and transcendent Existence” [11]. These practices are believed to have originated in early civilization on the Indian subcontinent and have been practiced historically in India and throughout East Asia [12]. Yoga techniques include the practice of meditation, regulation of respiration with a variety of breathing exercises, and the practice of a number of physical exercises and postures, in which the focus is more on isometric exercise and stretching than on aerobic fitness. It seems that, yoga improves psychological conditions to manage stress, reduce anxiety and negative emotions, and increase positive emotions and to achieve emotional balance [13-14]. Despite the popularity and positive physiological effects, still, Yoga is not widely introduced to prevent and treat chronic diseases such as diabetes. Calderon et al. [10] and Mahajan et al. [15] conducted a study on subjects with mild to moderate hypertension and reported that yoga can play an important role in risk modification for cardiovascular diseases. Another study had reported a better lipid profile in long and medium term mediators when compared to non-meditators [16]. In view of these observations, the present study was undertaken to assess the effect of yoga practice on the lipid profile in patients with type 2 diabetes mellitus.

MATERIALS AND METHODS

Twenty women patients of type 2 diabetes mellitus in the age range of 50-70 yrs (with diabetes of 1-10 yrs duration) were recruited from two old age home, namely Debrup Nibas and Urmila Bridhashram, Kalikapur Colony, Bolpur, Birbhum, West Bengal, India. The patients were randomly divided into two groups equally; of which first group underwent yogic practice along with the conventional medicines and designated as yogic practice group (N=10). The remaining subjects act as control group and designated as control group (N=10). The yogic practice group were treated with their respective training of 45 minutes per day for three days (alternate) a week for a period of twelve weeks. The subjects of the active control group were not allowed to participate in any of the training programme and continued with the conventional medicines. The clearance from the Ethical committee of the Visva Bharati University was obtained and an informed written consent was taken from all the patients after the procedure was explained to them.

The yogic practices training programme was given to yogic practice group for 12 weeks of one session in the morning between 7.00 a.m. to 7.45 a.m. for three days on Monday, Wednesday and Friday. Prior to every training session, subjects underwent 5 to 10 minutes warm-up exercises. Training volume and intensity were increased progressively in 4th and 9th weeks. The details of yogic intervention were presented in the table no. 1:

Table- 1: Details of yogic intervention

Yogic Intervention	Position	Name	Time
Asanas	Standing	1. Surya Namaskar	30 minutes
	Sitting	2. Yogamudra	
		3. Paschimatyasana	
	Kneeling	4. Ardha Matsyendrasans	
		5. Bhadrasana	
	Prone	6. Bhujangasana	
		7. Shalabhasana	
		8. Dhanurasana	
	Supine	9. Nawkasana	
		10. Sethu Bandhasans	
		11. Shavasana	
Kriyas	Standing	12. Kapalabhati	5 minutes
	Sitting	13. Agnisara	
Pranayamas	Sitting	14. Ujjayi	10 minutes
		15. Aunloma-Viloma	
		16. Bhramari	

Before the start of experimental treatment, all 20 subjects underwent baseline testing for assessment of their blood lipid profile (Total cholesterol, Triglycerides, Low-density lipoprotein, Very low-density lipoprotein, High-density lipoprotein). Final testing, which repeat of the baseline tests, was conducted at the end of the 12-week yogic intervention. Blood lipid analyses were performed at the P.M. Hospital Pathological Laboratory of Visva-Bharati University.

Statistical Techniques Used

All the statistical calculations were done with the help of SPSS software Version 17. To find out the mean and standard deviation of the selected variables, descriptive statistics were employed. In order to find out the effects of yoga on lipid profiles of elder women with type 2 diabetes mellitus, the analysis of covariance (ANCOVA) was used and the F-ratio was found out. Whenever the F-ratio was found significant, least significant difference (LSD) post

hoc test applied to determine which of the paired means difference was significant. In all the cases 0.05 levels of significance were fixed.

RESULTS

From the table- 2, using ANCOVA, the F ratio for adjusted post-test means in Total cholesterol (TC), Triglycerides (TG), Low-density lipoprotein (LDL), Very low-density lipoprotein (VLDL), High-density lipoprotein (HDL) of the subjects were 21.85, 16.17, 18.22, 8.12, 20.53 respectively, which were significant at 0.05 level. The above analysis of the data indicated that there were a significant difference in the adjusted post-test means among yogic practice group and active control group. Further, to determine which of the paired means had a significant difference, the LSD post hoc test was applied and the result was presented in table 3. The adjusted post test mean values of five lipid profiles for yogic practice group and active control group was graphically represented in the figure 1.

Table- 2: Descriptive Statistics and Analysis of Covariance for the pre and post test data of lipid profiles of yogic practices group and control group

Lipid Profiles	Yogic Practice Group		Active Control Group		F-value
	Pre Test	Post Test	Pre Test	Post Test	
TC	206.90 ±30.94	201.80 ±31.70	207.80 ±36.90	207.90 ±36.50	21.85*
TG	166.90 ±28.62	161.90 ±27.87	159.70 ±23.64	160.20 ±23.67	16.17*
LDL	127.50 ±15.11	123.70 ±14.89	125.10 ±17.21	125.00 ±17.62	18.22*
VLDL	35.00±4.47	32.70±3.74	33.90±3.73	33.90±3.25	8.12*
HDL	47.60±3.66	51.20±3.55	47.40±3.37	47.30±3.33	20.53*

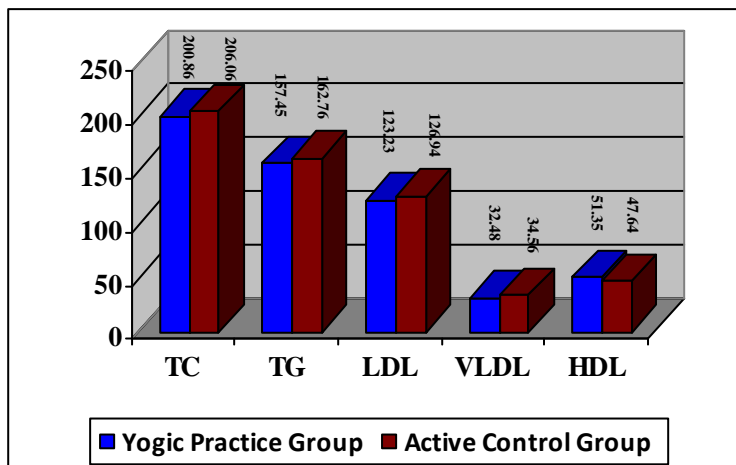
*Significant at the 0.05 level

Table- 3: LSD test for the differences between the adjusted post tests paired means of lipid profiles

Variables	Adjusted Post-test Means		Mean Differences	Standard Error
	YPG	ACG		
TC	200.86	206.06	-5.20*	0.733
TG	157.45	162.76	-5.31*	0.727
LDL	123.23	126.94	-3.71*	0.512
VLDL	32.48	34.56	-2.08*	0.519
HDL	51.35	47.64	3.71*	0.570

*Significant at the 0.05 level

Figure- 1: Adjusted post test mean values of lipid profiles of yogic practice group and control group



DISCUSSION

In this research study, the effect of yogic intervention on lipid profile in elder women with type 2 diabetes mellitus was studied. The results show that following 12 weeks of yogic intervention significant decrease in total cholesterol, triglycerides, low density lipoprotein and very low density lipoprotein with a significant increase in high density lipoprotein level from its initial value; while showing insignificant result in control group (Table 3 and Figure 1). The patients in both the groups as belonged to the old age home (more than 2 years), so it won't be wrong to assume their dietary habits and socio-economic statuses were similar.

The significant decreases in TC, TG, LDL and VLDL values coupled with significant increase in HDL in our participants imply an improved lipid profile having good prognostic value. This decrease of 'bad' cholesterol and a concomitant increase in 'good' cholesterol has significance when viewed in light of the cardiovascular risk profile of diabetic patients [17]. It has been previously reported that hatha yoga exercise and conventional PT exercise may have preventative and protective effects on diabetes mellitus by decreasing oxidative stress and improving antioxidant status [14]. A similar mechanism may be working in our patients as a systematic review also found the effects of yoga training to be more prominent with regard to fasting blood glucose level and lipid profile [18]. Innes and Vincent [17] reviewed 12 studies and reported that yoga improves lipid profile. Reductions in TC, TG, and LDL, VLDL and increase in HDL in our subjects are comparable with the findings of their review.

The decrease in lipid profile seen in this study is in agreement with the earlier studies. Sahay et al [19] and Bijlani et al [20] reported a significant reduction in free fatty acids, LDL, VLDL and an increase in HDL. The improvement in the lipid profile after yoga could be due to increased hepatic lipase and lipoprotein lipase at cellular level, which affects the metabolism of lipoprotein and thus increase uptake of triglycerides by adipose tissues [21-22]. These changes suggest improvement in the insulin sensitivity following yogic exercises.

CONCLUSION

The results of the present study indicate that, 12-week yogic intervention has positive effects on lipid profile in elder women with type 2 diabetes mellitus. From the above discussion, it may be concluded that, regular yogic practice 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.

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