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Research Paper

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Yogasana and Physical Exercise on LDL Cholesterol Among Male Diabetic Patients

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ABSTRACT

There is growing evidence that yoga and physical exercise may offer a safe and cost-effective intervention for Type 2 Diabetes mellitus (DM 2). This article critically reviews the published literature regarding the effects of yogasana and physical exercise on LDL cholesterol among male diabetes patients. Thirty type-2 male diabetic patients (n = 30) from one Medical College Hospital were randomly selected as subjects. The age of the subjects ranged from 35 to 50 years. The subjects divided into three equal groups of ten subjects each (n = 10). In which, the group I underwent yogasana (YG), group II underwent physical exercise (PEG) for six days per week for sixteen weeks and group III acted as a control (CG) who did not undergo any special training programme apart from their regular activities. LDL cholesterol was selected as a test variable and assessed before and after the training period. The collected data were statistically analyzed by using Analysis of Covariance (ANCOVA) and Scheffe's test was applied as a post hoc test to determine the paired mean difference. From the results of the study, it was found that there was a significant reduction ($p \leq 0.05$) in LDL cholesterol level of training groups when compared to control group.

Introduction

Yoga is an old, traditional, Indian psychological, physical and spiritual exercise regimen that has been studied for several decades for its role in the management of several chronic diseases including obesity, neuromuscular diseases and psychiatric illnesses (Gupta et al, 2006, Van et al., 2007 and Yang, 2007). Additionally yoga has been studied for controlling both the symptoms and the complications associated with diabetes mellitus type II (Manyan et al., 2002)). The results from these studies suggested a statistically significant role for yoga in controlling diabetes. Furthermore, yoga practice showed a significant improvement for those with diabetic patients with pre-existing complications (Innes et al., 2005). These findings suggest that diabetics may benefit from yoga's ability to improve their quality of life. There are several hypotheses for the biological mechanisms that link the benefits of yoga in diabetes management (Sahay et al., 2007. A review of the World health organization, this is urgently needed as type II diabetes is fast becoming one of the leading disabling diseases worldwide (WHO, 2007). In addition, this review will help family physicians and endocrinologists in answering the queries of type II diabetic patients with regard to the effect of yoga practice on their medical condition.

Systematic physical activity develops and maintains physical fitness and overall health. One important regimen for people with diabetes and for those at risk for developing diabetes is engaging in appropriate physical activity. The beneficial effects of physical activity typically include reductions in glucose level and body weight (USDHHS, 2004). It is often practiced to strengthen muscles and the cardiovascular system, and to improve athletic skills. Frequent and regular physical exercise boosts the immune system, and helps prevent diseases of affluence such as heart disease, cardiovascular disease. Frequent and regular physical exercise boosts the immune system, and helps prevent diseases of affluence such as heart disease, cardiovascular disease (Ronald et al., 2004). An adaptation of the human body to physical exercise can improve the health of internal systems and the efficiency of external movements.

Lipoproteins are transport vehicles in the circulating plasma that are composed of various lipids such as cholesterol, phospholipids, triglycerides and proteins known as apoproteins (Kravitz & Heyward, 1993). LDL-C is the primary transport carrier of cholesterol in the circulation. About 50-60% of cholesterol is delivered to the cells by LDL-C. Evidence suggests that LDL-C may directly contribute to the cellular alterations of the inner walls of the arteries which may ultimately lead to the development of atherosclerotic plaque (Scann, 1978). Thus, LDL-C is proposed to be more highly associated with CHD than total cholesterol. Recent overviews have indicated that a 1% reduction in a person's total serum cholesterol level yields a 2 to 3% reduction in the risk of coronary heart disease (Manson et al., 1992). Elevated levels of LDL cholesterol have been strongly associated with an increased risk of heart attack and stroke (Yataco *et al*., 1997). LDL-C tends to stick the lining of the blood vessels, which helps to stimulate atherosclerosis. This is why LDL cholesterol has been called "bad" cholesterol. This study has attempted to investigate the sixteen weeks of yogasana and physical exercise on low density lipoprotein cholesterol of men type 2 diabetic patients.

Materials and methods

For this purpose only type-2 male diabetes patients from Rajah Muthiah Medical College and Hospital, Annamalai University, were randomly selected as subjects. Their age were ranged between 35 and 50 years. The selected thirty subjects were divided into three groups of ten each. Out of which, group I (n = 10) underwent yogasana, group II (n = 10) underwent physical exercises and group III (n = 10) remained as a control. The training programme was carried out for six days per week during morning session only (6 am to 8 am) for sixteen weeks. LDL cholesterol was selected as criterion variable and it was measured by using the formula developed by Friedewald (1972). LDL cholesterol = Total cholesterol – (HDL-c + TGL/5) and it was expressed as mg/dl. Both experimental groups initially performed thorough warming up exercises. After that group I performed the following yoga exercises. These are the exercises were given, padmasan, bhujangasan, halasan, vajrasan, eka padhasan, parivatasan, oorthavamuga bhujangasan, dhanurasana, shasangasan, veerabhadhrasan, vakhrasan, patchimoththanasan, shalabhasan, trikonasan and padhahasthasan with moderate intensity. Group II performed calisthenics, stretching, sit-ups, pushups and medicine ball exercise with moderate intensity.

Data Analysis

Mean and standard deviation were calculated for LDL cholesterol for each group. The data were analyzed by using analysis of covariance (ANCOVA). If the F value was found to be significant for adjusted post-test mean, Scheffe's test was used as a post hoc test to determine the significant difference between the paired mean. Statistical significance was set to priority at 0.05 levels.

Results

Table I. Analysis of covariance for LDL cholesterol of experimental groups and control group

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Test		YG	PEG	CG	SOV	SS	df	MS	F
Pre test	Mean	122.1	120.6	121.98	B	13.91	2	6.95	0.55
	S.D.	2.85	3.69	4.05	W	342.94	27	12.70	
Post test	Mean	102.5	100.2	121.79	B	2811.74	2	1405.87	115.92*
	S.D.	3.06	3.58	3.76	W	327.47	27	12.13	
Adjusted Post test	Mean	102.38	100.41	121.71	B	2739.83	2	1369.91	114.34*
					W	311.51	26	11.98	

*Significant F (df 2, 27) (0.05) = 3.35; ($p \leq 0.05$) F (df 2, 26) (0.05) = 3.37; ($p \leq 0.05$)

The table I showed that the pre test mean values on LDL cholesterol in yogasana group, the physical exercise group and control group were 122.1, 120.6 and 121.98 respectively. The obtained *F* ratio of 0.55 for pre test which was lower than the required table value 3.35 with df 2 and 27 at 0.05 level of confidence. The post test mean values for yogasana group physical exercise group and control group were 102.5, 100.2 and 121.79 respectively. The obtained *F* ratio of 115.92 for post test which was higher than the required table value 3.35 with df 2 and 27 at 0.05 level of confidence. The adjusted post test mean values on LDL cholesterol for yogasana group physical exercise group and control group were 102.38, 100.41 and 121.51 respectively. The obtained *F* ratio of 114.34 for adjusted post test which was higher than the required table value 3.37 with df 2 and 26 for significance at the 0.05 level of confidence on LDL cholesterol.

Hence, the results of the study showed that there was a significance difference exists between yogasana group, physical exercise group and control group on LDL cholesterol. Further to determine which of the paired means has a significant improvement, Scheffẽ*'s* test applied as a post - hoc test. The result of the follow up test was presented in Table II.

Table II. Scheffe's post hoc test for mean difference between groups of LDL cholesterol

YG	PEG	CG	MD	CI
102.38	100.41		1.97	
102.38		121.71	19.33*	4.02
	100.41	121.71	21.3*	

*Significant, $p \leq 0.05$

Table II showed that the adjusted post test mean difference in LDL cholesterol between yogasana group and control group and physical exercise group and control group are 19.33 and 21.3 respectively. These values are higher than the required confidence interval value of 4.02, which shows significant difference at the 0.05 level of confidence. The results of the study showed that there was a significant difference between experimental groups and control group. It also showed that there was an insignificant difference between two experimental groups. The pre, post and adjusted post test mean values of experimental groups and control group on LDL cholesterol was graphically represented in the figure 1.

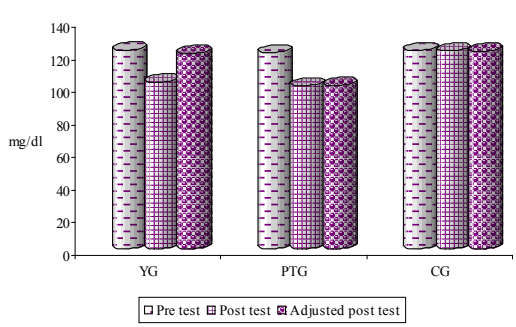

Figure 1: The pre, post and adjusted post test mean values of experimental groups and control group on LDL cholesterol

Discussion

This study shows that the yogasana and physical exercise are capable of decreasing LDL cholesterol level in men with type 2 diabetic patients. Type 2 diabetic patients engaged in yoga exercise and demonstrated lower LDL concentrations. The results of this study are similar to that of Bijlani et al., where yoga significantly decreased LDL ratio in individuals attending a lifestyle education based program for 9 days (Bijlani *et al*., 2005). Other researchers have reported that yogasanas significantly reduced LDL cholesterol in patients with type 2 diabetes mellitus (Singh *et al*., 2001). Malhotra reported significant improvement in glycemic control and lipid profile in type 2 diabetic patients exposed to yoga exercise where there was significant reduction in LDL concentrations (Malhotra et al., 2005). Mercuri *et al*. (2003) reported a significant reduction in LDL concentrations within three months of yoga exercise in type 2 diabetic patients. Evidence for the benefits of physical activity includes its effects shown to decrease the low-density lipoprotein (LDL) (Tamai *et al*., (1988), Scheers *et al*., (2008) and Eble *et al*., (2009)). Many previous studies have shown exercise is beneficial and decreases LDL (Dimitriou *et al.,* 2007 and Woolf *et al*., 1999) in men. Leon and Sanchez, (2001) concluded that aerobic exercises appeared to decrease the LDL in men and women. Mackinnon and Hubinger, (1999), concluded that exercise training decrease the level of LDL-C in the blood. Thirty minutes per day of vigorous exercise, like jogging, has sustained beneficial effects on LDL metabolism. Continued inactivity resulted in significant increases in low-density lipoprotein (LDL). No previous studies have attempted to compare the responses of LDL cholesterol to yogasana and physical exercise in male diabetic patients. Therefore, the present study was designed to determine the yogasana and physical exercise on LDL cholesterol level of type-2 male diabetic patients

Conclusion

None of the included trials report any side effects for yoga practice and physical exercise. Short-term benefits for patients with diabetes might be achieved from practicing yoga and physical exercise. Yoga exercises and physical activity are the some activity to develop or maintain physiological variables and overall health. Prevailing evidence supports the concept that yoga exercise and physical activity can help to decrease the LDL cholesterol among type -2 diabetic patients. The result of the study indicated that there was significant reduction in LDL cholesterol levels of male type -2 diabetic patients due to sixteen weeks of yogasana and physical exercise.

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