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Yogic Exercises and Physical Activities on Total Cholesterol of Type 2 Male Diabetic Patients

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ABSTRACT

Yoga and physical activity are rapidly gaining in popularity and has many health benefits. Yet health care providers have been slow to recognize yoga for its ability to improve health conditions, and few interventions have been developed that take full advantage of its benefits. The purpose of this article is to review published studies using yoga and physical programme to determine the effect of yogic exercises and physical activities on total cholesterol of type 2 male diabetic 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 40 to 50 years. The subjects divided into three equal groups of ten subjects each (n = 10). In which, group I underwent yogic exercises (YEG), group II underwent physical activities (PAG) for six days per week for sixteen weeks and group III acted as control (CG) who did not undergo any special training programme apart from their regular activities. Total cholesterol was selected as a test variable and assessed before and after the training period. The collected data were statistically analysed 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 total cholesterol of training groups when compared to control group.

KEYWORDS : Yogic exercise, physical activity, total cholesterol, type 2 diabetes

Introduction

The science of yoga is an ancient one. It is a rich heritage of our culture. Several older books make a mention of the usefulness of yoga in the treatment of certain diseases and preservation of health in normal individuals (Astrand & Keare, 1970). It was collated, coordinated and systematized by Patanjali in his classical work, the yoga sutras, which consists of 185 terse aphorisms. The system of yoga is called because it teaches the means by which the jivatma can be united to, or be in communion with the paramathma, and so secure liberation (moksa). Yoga is a complete science of life that originated in India many thousands of years ago. It is the oldest system of personal development in the world, encompassing body, mind and spirit (Gore, 1987, 1970). Yoga is an ancient art based on a harmonizing system of development for the body, mind, and spirit. The continued practice of yoga will lead you to a sense of peace and well-being, and also a feeling of being at one with their environment (McCall, 2007). The practice of yoga makes the body strong and flexible; it also improves the functioning of the respiratory, circulatory, digestive, and hormonal systems.

One important regimen for people with diabetes and for those at risk for developing diabetes is engage in appropriate physical activity. The beneficial effects of physical activity typically include reductions in glucose level and body weight (USDHHS, 2004). As a particular form of physical activity, yoga programs using various physical postures have been shown to benefit individuals with a wide range of health conditions including diabetes (Bijlani *et al*, 2005). 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. Such an adaptation to one kind of stress may also prepare the person physically and emotionally to resist other stresses life.

Cholesterol is a waxy steroid of fat that is produced in the liver or intestines. It is used to produce hormones and cell membranes and is transported in the blood plasma of all mammals.[2] It is an essential structural component of mammalian cell membranes and is required to establish proper membrane permeability and fluidity. In addition, cholesterol is an important component in the manufacture of bile acids, steroid hormones, and vitamin D (Emma, 2009). Total cholesterol is the sum of all the cholesterol in the blood. It is used to produce hormones and cell membranes and is transported in the blood plasma of all mammals (Emma, 2009). In addition, cholesterol is an important component in the manufacture of bile acids, steroid hormones, and vitamin D. Cholesterol is an important and necessary for mammals, high levels of cholesterol in the blood can damage arteries and are potentially linked to diseases such as those associated with the cardiovascular system (Pearson et al., 2003). The liver is the major production factory for cholesterol (about 70%). High cholesterol levels are strong indicators of those individuals that are prone to coronary heart disease (Olsin, 1998). Elevated total cholesterol is a risk factor for coronary heart disease. Two types of cholesterol: Good cholesterol or high density lipoprotein (HDL) and a bad cholesterol or low-density lipoprotein (LDL). In this study, moderate intensity of resistance training was applied to normalize the level of cholesterol in the body. TC = LDL + HDL + (Triglycerides/5)

Materials and methods

For this purpose only type-2 male diabetes patients from Rajah Muthiah Medical College and Hospital, Annamalai University, Tamil Nadu were randomly selected as subjects. Their age were ranged between 40 and 50 years. The selected thirty subjects were divided into three groups of ten each. Out of which, group I (n = 10) underwent yogic practices, 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. Total cholesterol was selected as criterion variable for this study and it was measured by oxides enzymatic method using the Boechringer Mannheim kit. 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 total cholesterol for each group. And 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 Total Cholesterol of experimental groups and control group

Test		YEG	PAG	CG	SOV	SS	df	MS	F
Pre test	Mean	190.1	189.9	188.9	B	8.27	2	4.13	0.301
	S.D.	3.21	3.84	4.01	W	370.7	27	13.73	

Post test	Mean	166.9	169.05	190.06	B	3274.76	2	1637.38	46.27*
	S.D.	7.03	6.40	3.98	W	955.45	27	35.39	
Adjusted Post test	Mean	166.84	169.01	190.16	B	3247.77	2	1623.88	44.51*
					W	948.51	26	36.48	

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

The table I showed that the pre test mean values of total cholesterol for yoga exercise group, physical activity group and control group were 190.1, 189.9 and 188.9 respectively. The obtained *F* ratio of 0.301 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 of yoga exercise group, the physical activity group and control group were 166.9, 169.05 and 190.06 respectively. The obtained *F* ratio of 46.27 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 of total cholesterol for yoga exercise group, physical activity group and control group were 166.84, 169.01 and 190.51 respectively. The obtained *F* ratio of 44.51 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 total cholesterol.

Hence, the results of the study showed that there was a significance difference exists between yoga exercise group, physical activity group and control group on total cholesterol. Further to determine which of the paired means has a significant improvement, Scheffé's test was 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 total cholesterol

YEG	PAG	CG	MD	CI
166.84	169.01		2.17	
166.84		190.16	23.32*	7.01
	169.01	190.16	21.15*	

***Significant, p £ 0.05**

Table II showed that the adjusted post test mean difference in total cholesterol between yoga exercise group and control group and physical activity group and control group are 23.32 and 21.15 respectively. These values are higher than the required confidence interval value of 7.01, 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 total cholesterol was graphically represented in the figure 1.

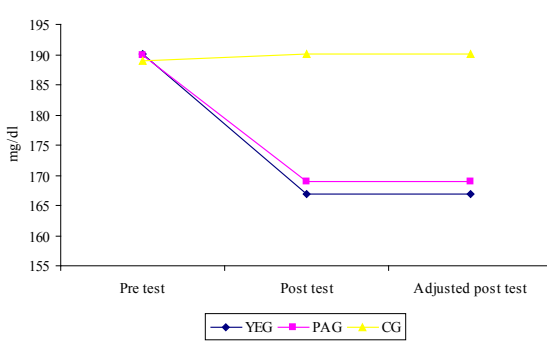

Figure 1: The pre, post and adjusted post test mean values of experimental groups and control group on total cholesterol

Discussion

The present study confirmed the positive effects of yoga as well as physical activities on the total cholesterol status in type 2 diabetes over sixteen weeks. Type 2 diabetic patients engaged in yoga exercise and physical activities demonstrated lower total cholesterol. The results of this study are similar to that of Bijlani et al. where yoga significantly decreased TC ratio in individuals attending a lifestyle education based program for 9 days (Bijlani *et al.,* 2005). Other researchers have reported that yogasanas significantly reduced total cholesterol in patients with type 2 diabetes mellitus (Singh *et al.,* 2001). Exercise is a major therapeutic modality in the treatment of diabetes mellitus (Laaksonen *et al*., 2000). Exercise training has been known to be effective in type 2 diabetes mellitus by increasing insulin sensitivity (Ibanez *et al*., 2005), and regular exercise can strengthen antioxidant defenses and may reduce oxidative stress (Kim *et al*., 1996). Exercises including yoga postures have been shown to play a role in preventing type 2 diabetes (Sahay & Dahay, 2002). The yoga postures are slow rhythmic movements which emphasize the stimulation of the organs and glands by easy bending and extensions which do not over-stimulates muscles but concentrate on glandular stimulation (Nayak & Shaukar, 2004). Epidemiological research has decisively demonstrated that low concentrations of total cholesterol and low-density lipoprotein cholesterol (LDL-C), and high levels of high-density lipoprotein cholesterol (HDL-C) are associated with a decrease in coronary heart disease (Kannel, 1983) . Several investigators have reported favorable changes in blood lipids and lipoproteins following a training intervention (Braith & Stewart, 2006)). From the results of the present study and literature, it is concluded that the total cholesterol was significantly reduced due to yogic exercise and physical activity. Therefore, the present study was designed to determine the yogic exercises and physical activities on total cholesterol of type-2 male diabetic patients

Conclusion

The findings of the study demonstrate the efficacy of yoga exercise and physical activity on total cholesterol status in patients with type 2 diabetes. The response observed using a yoga exercise in type 2 diabetic patients was similar to that of physical activities. These findings suggest that yoga exercise and physical activity have therapeutic preventative and protective effects in type 2 diabetes by decreasing total cholesterol. This may have direct impact on the use of yoga exercise and physical activities are the safe therapeutic modality in diabetes mellitus. The result of the study indicated that there was significant reduction in total cholesterol levels of male type -2 diabetic patients due to sixteen weeks of yoga exercise as well as physical activities programme.

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