



ISSN: 2456-0057  
 IJPNPE 2019; 4(1): 887-889  
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 www.journalofsports.com  
 Received: 24-11-2018  
 Accepted: 25-12-2018

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## Comparative effect of yogic practices with green tea supplementation on cholesterol levels of obese men

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### Abstract

This study aims at finding out the effect of yogic practices (YP) and yogic practices with green tea supplementation (YPwGT) on total cholesterol (TC) and low density lipoprotein (LDL) among obese men. Forty five obese men with 30 kg/m<sup>2</sup> to 40kg/m<sup>2</sup> of Body Mass Index and they were divided into three equal groups consisting of fifteen (n=15) subjects each. Experimental Group I underwent yogic practices without green tea (YP) for five days per week. Experimental Group II underwent yogic practices with green tea (YPwGT) for five days per week and group III acted as Control Prior to the experimental treatments, all the subjects were measured of their total cholesterol and low density lipoprotein through laboratory analysis of blood samples and scored recorded were considered as initial scores. The experimental group I underwent yogic practices consisting of suryanamaskar and 10 asanas and the training sessions lasted for 40 minutes. Experimental group II in addition to the yogic practices was provided with green tea supplementation. The experimental treatments lasted for 16 weeks with respective experimental treatments and immediately after completion of experimental treatment, the subjects was once again measured of their TC and LDL which formed the final scores. The difference between the initial and final scores was considered as the effect of experimental treatment. The NCOVA results proved there was significant reduction of TC and LDL due to YP and YPwTG. Tough there were better reduction of cholesterol levels due to YPwTG, the difference was not found significant. It was concluded YP and YPwTG can be practiced by obese men to manage their cholesterol levels, TC and LDL.

**Keywords:** Yoga, green TEA, LDL, HDL, TC, obese men

### Introduction

Obesity is defined as abnormal or excessive fat accumulation that poses a risk to health. Exercise is a key component in the prevention of obesity. This is a condition in which energy intake, in the form of food, exceeds the energy expenditure of daily living and the excess energy is stored in the form of adipose tissue made up of fat cells. Two factors facilitate the onset and progressive nature of obesity. The first is the age related reduction in the energy expended to maintain waking bodily functions the basal metabolic rate of about 2% every 10 years. The second is the lowered metabolic rate of obese individuals. Combine these two factors with reduced physical activity and the development of obesity is inevitable.

The practice of yoga is an art and science, dedicated to creating union between the body, mind and spirit. Its objective is to assist the practitioner in using the breath and body to foster an awareness of ourselves as individualized beings intimately connected to the unified whole of creation. In short, it is about making balance and creating equanimity so as to live in peace, good health and harmony with the greater whole. This art of right living was perfected and practiced in India thousands of years ago and the foundations of yoga philosophy were written down in *The Yoga Sutra* of Patanjali, approximately 200 AD. This sacred text describes the inner workings of the mind and provides an eight-step blueprint for controlling its restlessness so as to enjoying lasting peace (Eugene, 1997) <sup>[3]</sup>.

Manchanda SC and Madan K (2014) investigated the effects of yoga and meditation on cognitive, Physical and hematological variables of school children aged between 11 to 16 years. The results of the yoga experimental group (n=20) was significantly improved than those of the control group (n=20) in all physical, cognitive and hematological variables ( $P<0.05$ ).

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The assessments showed that the cognitive variables difference were much superior to the control group. Investigated the effects of naturopathy, yogic practice on selected biochemical variables among obese college students and found yogic practices (Group-II) had significantly altered total cholesterol and Triglycerides.

Green tea, one of the most popular drinks around the world, may benefit bone health and the researchers suggest it has the potential to help prevent and treat osteoporosis and other bone diseases suffered by millions of people worldwide. Other studies have already suggested that chemicals in green tea benefit health in many ways, for example by preventing cancer and heart disease, but this is the first study to pinpoint which of those chemicals may also improve bone health by stimulating formation and slowing the breakdown of bone. The chemicals were epigallocatechin (EGC), gallic acid (GC), and gallic acid gallate (GCG), all main components of green tea. They found that one catechin in particular, EGC, stimulated the action of a key enzyme that promotes bone growth by up to 79 per cent. The effect of boosting EGC also increased the level of bone mineralization in the cells, which strengthens bones. They also found that EGC weakened the activity of osteoclasts, tipping the delicate bone metabolism balance away from resorption to formation. The researchers also noted that the catechins did not appear to cause toxic effects in the bone cells.

Jianwei Zhou, *et al.* (2016) [4] investigated the green tea effects on the levels of serum glucose and lipid profiles and found green tea really affects the level haematological and serological indices of the male and female populations with the habit of long term green tea intake. Joanna Suliburska, *et al.* (2012) [5, 7] investigated the effects of green tea extract on the mineral, body mass, lipid profile, glucose, and antioxidant status of obese patients and demonstrated that green tea influences the body's mineral status. Moreover, the results of this study confirm the beneficial effects of green tea extract supplementation on body mass index, lipid profile, and total antioxidant status in patients with obesity

Thus, there are several studies which prescribe different sets of exercises to reduce obesity and there are researches that diet regulations have significant influence to reduce obesity. To manage obesity every one is expected to be encouraged for

suitable physical activity and diet regulations for the all round health development. The review of previous researches proved that attempts were made to find out the isolated effects of yogic practices and green tea supplementation on cholesterol levels of obese men. This study aims at finding out the effect of yogic practices (YP) and yogic practices with green tea supplementation (YPwGT) on total cholesterol (TC) and low density lipoprotein (LDL) among obese men.

## Methodology

### Experimental Design

Forty five obese men with 30 kg/m<sup>2</sup> to 40kg/m<sup>2</sup> of Body Mass Index were randomly selected from Chennai District, Tamil Nadu. The subjects were from different family background and homogeneous in their activities. They were divided into three equal groups consisting of fifteen (n=15) subjects each. The selection of control and experimental groups were done at random. Experimental Group I underwent yogic practices without green tea (YP) for five days per week. Experimental Group II underwent yogic practices with green tea (YPwGT) for five days per week and group III acted as Control Group. Subjects who were in the control group were not exposed to any experimental training Prior to the experimental treatments, all the subjects were measured of their total cholesterol and low density lipoprotein through laboratory analysis of blood samples and scored recorded were considered as initial scores. The experimental group I underwent yogic practices consisting of suryanamaskar and 10 asanas and the training sessions lasted for 40 minutes. Experimental group II in addition to the yogic practices was provided with green tea supplementation. The experimental treatments lasted for 16 weeks with respective experimental treatments and immediately after completion of experimental treatment, the subjects was once again measured of their total cholesterol and low density lipoprotein which formed the final scores. The difference between the initial and final scores was considered as the effect of experimental treatment. To test significance, ANCOVA was used and in all cases 0.05 level was fixed to test the significance of the study.

## Results

**Table 1:** Effects of YP and YPwGT on Total Cholesterol and Low Density Lipoprotein among obese men.

	YP Group	YPwGT Group	Control group	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained F
<b>Total Cholesterol</b>								
Pre Test Mean	212.40	213.40	219.87	Between	492.84	2	246.42	1.11
				Within	9294.93	42	221.31	
Post Test Mean	197.27	194.47	221.93	Between	6853.51	2	3426.76	33.85*
				Within	4251.60	42	101.23	
Adjusted Post Test Mean	198.74	195.42	219.50	Between	4867.08	2	2433.54	58.64*
				Within	1701.61	41	41.50	
Mean Diff	-15.13	-18.93	2.07					
<b>Low Density Lipoprotein</b>								
Pre Test Mean	121.47	121.73	121.47	Between	0.71	2	0.36	0.01
				Within	2802.40	42	66.72	
Post Test Mean	113.07	110.80	122.40	Between	1134.04	2	567.02	7.47^
				Within	3186.93	42	75.88	
Adjusted Post Test Mean	113.15	110.64	122.48	Between	1167.13	2	583.56	23.90^
				Within	1001.20	41	24.42	
Mean Diff	-8.40	-10.93	0.93					

\* Significant at 0.05 level.

The results presented in Table 1 shows that there was significant differences on post test and adjusted means as the obtained F values 33.85 and 58.64 were significant at 0.05 level on total cholesterol as well as 7.47 and 23.90 on low

density lipoprotein. Since significant results were obtained the data were further subjected to post hoc analysis and results presented in Table 2.

**Table 2:** Multiple comparisons of paired adjusted means and scheffe's post hoc analysis results on total cholesterol and low density lipoprotein among obese men

YP Group	YPwGT Group	Control Group	MEAN DIFF	Reqd. C.I
<b>Total Cholesterol</b>				
198.74	195.42		3.32	5.95
198.74		219.50	-20.76*	5.95
	195.42	219.50	-24.08*	5.95
<b>Low Density Lipoprotein</b>				
113.15	110.64		2.50	4.56
113.15		122.48	-9.33*	4.56
	110.64	122.48	-11.84*	4.56

\*Significant at 0.05 level

## Discussions

The results presented in Table 1 proved that YP has reduced 15.13 mg/dl due to YP and YPwGT group reduced 18.93 mg/dl of total cholesterol Similarly YP has reduced 8.40 mg/dl of LDL and YPwGT group reduced 10.93 mg/dl LDL. The mean difference was further subjected to ANCOVA and obtained F values were significant at 0.05 level. The post hoc analysis and paired mean comparisons results presented in Table 2 shows that compared to control group YP and YPwGT groups significantly reduced total cholesterol and LDL. Even though YPwGT group showed better reduction in cholesterol levels studied the differences were not significant at 0.05 level.

Ajay Pal, *et al.* (2011) <sup>[1]</sup> investigated the effect of yogic practices determined that reduction of SBP, DBP, heart rate, body fat%, total cholesterol, triglycerides and LDL after regular yogic practices is beneficial for cardiac and hypertensive patients. Anjum Sayyed, *et al.* (2010) <sup>[2]</sup> investigated the study of lipid profile and pulmonary functions in subjects participated in sudarshan kriya yoga determined that significantly reduces the total cholesterol. Xin Xin Zheng, *et al.* (2011) <sup>[8]</sup> investigated to identify and quantify the effect of green tea and its extract on total cholesterol, LDL cholesterol, and HDL cholesterol and showed that the administration of green tea beverages or extracts resulted in significant reductions in serum TC and LDL-cholesterol concentrations, but no effect on HDL cholesterol was observed. Pawel, *et al.* (2012) <sup>[5, 7]</sup> investigated the 56 obese, hypertensive subjects were randomized to receive a daily supplement of 1 capsule that contained either 379 mg of GT extract (GTE) or a matching placebo, for 3 months Supplementation also contributed to significant decreases in the total and low-density lipoprotein cholesterol and triglycerides, but an increase in high-density lipoprotein cholesterol. The findings of this study that YP and YPwGT would significantly alter cholesterol levels, total cholesterol and low density lipoprotein were in agreement with these previous researches.

## Conclusions

It was concluded that YP and YPwTG can be practiced by obese men for management of cholesterol levels.

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