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Effect of Pranayama and Yogasanas on Apolipoproteins, Lipid Profile and Atherogenic Index in Healthy Subjects

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Abstract

Coronary Heart Disease is one of the major causes of death and having a prevalence of 10% in Indian population. Dyslipidemia is one of the important modifiable risk factor. It initiates atherosclerotic plaque formation, finally resulting in degeneration of endothelial cell function, which enhances the coagulability of blood by activation of various factors for which apolipoproteins have been implicated. Various attempts such as physical exercises and dietary modifications have been performed to control the lipid content of blood. The aim of present study was to know the effects of Pranayama and Yoga on Apolipoproteins, lipid profile and atherogenic index in healthy subjects. In this study we recruited a group of 30 healthy age and sex matched subjects from whom blood was drawn before and after Pranayama and yoga for assay of Apolipoproteins and lipid profile by immunoturbidimetric and enzymatic methods, respectively. Total Cholesterol, Triglycerides, LDL, Apolipoprotein B_{100} were decreased and HDL, Apolipoprotein A1 were increased after Pranayama and Yoga.

Keywords: Pranayama, Yoga, Apolipoproteins, Lipid Profile.

Introduction

The present age of speed and competition has increased the stresses and strains. It is resulting in life style related health problems such as Obesity, Diabetes Mellitus, Hypertension and Coronary Artery Disease (Deshpande, et al, 2008). Yogasanas and Pranayama can solve the above problems by free of cost. Hence, Yoga and Pranayama has been incorporated into modern medicine during recent decades. Yoga is the best lifestyle modification which aims to attain the unity of mind, body and spirit through asana /exercise, pranayama and meditation (Ankad, et al., 2011). Breath is a dynamic bridge between the body and mind. Hence, life experiences can distort breathing pattern. Pranayama is the art of prolongation and control of breath that helps in bringing conscious awareness to breathing and reshaping habits and patterns (Ankad, et al., 2011).

Bhastrika Pranayama

In this, sit in any comfortable position and inhale till diaphragm is full and exhale with force, this is known as Bhastrika pranayama and should be done according to individual capacity in three different ways, slow, medium and fast. This Pranayama should be practiced for three to five minutes (Ramdevji, 2000).

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Kapalbhati Pranayama

'Kapal' means 'brain' and 'bhati' means 'light or shine or brightness'. This is slightly different from Bhastrika Pranayam. In this inhaling, exhaling is done with the same speed but in Kapalbhati force is laid on exhaling with full force. In this do not try to inhale but air enters automatically while exhaling. The exhaling process should be with full concentration (Ramdevji, 2000).

Bahya Pranayama

In this sit in Padmasana and exhale all at once completely with full force then do Moolbandha, Uddiyan and Jalandhara bandha and control the breath outside for a long possible. Then remove all three bandha and breathe normally. Inhale and repeat the pranayama without stopping it up to 3-7 times according to capacity (Ramdevji, 2000).

Anuloma-viloma Pranayama

This is one of the most important Pranayama that helps us to bring balance between the distance of the dominance of left and right hemispheres of the human brain. In this press right nostril with right thumb and breath in completely from left nostril then close the left nostril with middle and ring finger and exhale completely from right nostril. Then inhale from right nostril and exhale from left nostril (Ramdevji, 2000).

Brahmari Pranayam

Inhale and press the nostrils with the tips of middle fingers and concentrate in between the two eyes. Close both ears with thumbs and make a sound like 'Om'. Repeat it once Again and do at least 3-21 times according to capacity. This pranayama should be done with full concentration and deep devotion towards God (Ramadevji, 2000).

Udgeetha Pranayama

Inhalation and exhalation should be long, slow, soft and subtle. Inhale slowly and when ready to exhale, chant Om slowly and steadily. With practice, lengthen each breath to one-minute, that is, to say inhalation and exhalation should total one-minute of time. Visualize the breath entering and moving inside the body. Beginners may feel the breath just in their nose but with practice and proper concentration, they may feel the "touch" of the breath inside their whole self (Sharma, 2006).

Ujjayi Pranayama

Bring your mind to the throat and contract it (referring to glottal contraction). Throat contraction is just like when you close the fist by contracting your hand. Beginners should first simply practice inhaling and contracting the throat and making short sounds like "oo" "oo" several times during one inhalation. Having acquired the awareness of throat contraction and some voluntary control over throat contraction, you are ready to practice Ujjayi. Deeply inhale while contracting the throat and making a sharp shrilling sound like "OO." (Sharma, 2006)

Objectives

1. To estimate the serum levels of Apolipoproteins and lipid profile.
2. To evaluate the effectiveness of yogasanas, pranayama and meditation on Apolipoproteins, lipid profile and Atherogenic index.

Methodology

15 male and 15 female healthy subjects of age group 20 - 60 years were selected randomly from Anatapurmu town, Andhra Pradesh, India who had not yet practiced before in any kind of yoga. Same subjects were chosen as both study as well as control group to make the study more reproducible. Consent from subjects and Ethical clearance was taken. Subjects were excluded with Smoking, Alcohol consumption, Lipid metabolism disorders, Heavy exercises, Diabetes and other Endocrine disorders. All subjects were asked to practice same Yogasanas and Pranayama training for a period of one month. The duration of practice was for two hours between 5 to 7 a.m. in fasting state. The fasting venous blood samples were drawn from the study subjects at the beginning and after 30 days of yogasanas and pranayama for analysis of lipid profile and apolipoproteins. The following investigations were carried out using the separated serum from these subjects Serum Total Cholesterol, Triglycerides, HDL-C, LDL-C by enzymatic method (Burtis, et al, 2006). Apolipoproteins A1 and B by Immunoturbidimetric method (Burtis et al, 2006). Statistical analysis is done by using Student's paired 't' test.

Results

There is a significant reduction in the levels of Total cholesterol, LDL-C, Apolipoprotein B and ratio of Apo B/Apo A1, also significant increase in the levels of HDL-C and ratio of HDL-C/T.Cholesterol after Yoga and pranayama which is shown in Table-I.

Table I. Lipid profile and Apolipoproteins in Healthy Subjects before and after Yogasanas and Pranayama Practice Values Expressed as mean ± SD. *Significant at <0.001

Parameters	Before Yogasanas & Pranayama mg/dl	After Yogasanas & Pranayama mg/dl	P value
Total cholesterol	170.87±44.14	150.57±33.52*	< 0.001
Triglycerides	147.50±84.52	143.20±84.20	0.64
HDL-C	37.30±7.65	43.17±6.58 *	<0.001
LDL-C	106.23±42.42	87.20±35.57 *	<0.001
VLDL	29.47± 16. 93	27.57±15.65	0.07
Apolipoprotein A1	105.10±37.45	113.50±39.11 *	<0.001
Apolipoprotein B	86.60±19.27	76.13±15.05*	<0.001
HDL-C / T.Cholesterol	0.23±0.07	0.30±0.07*	<0.001
Apo B/Apo A1	0.88±0.26	0.68±0.20 *	<0.001

Figue I. Showing Comparison of Levels of Lipid Profile and Apolipoproteins in Healthy Subjects before and after Yogasanas and Pranayama Training

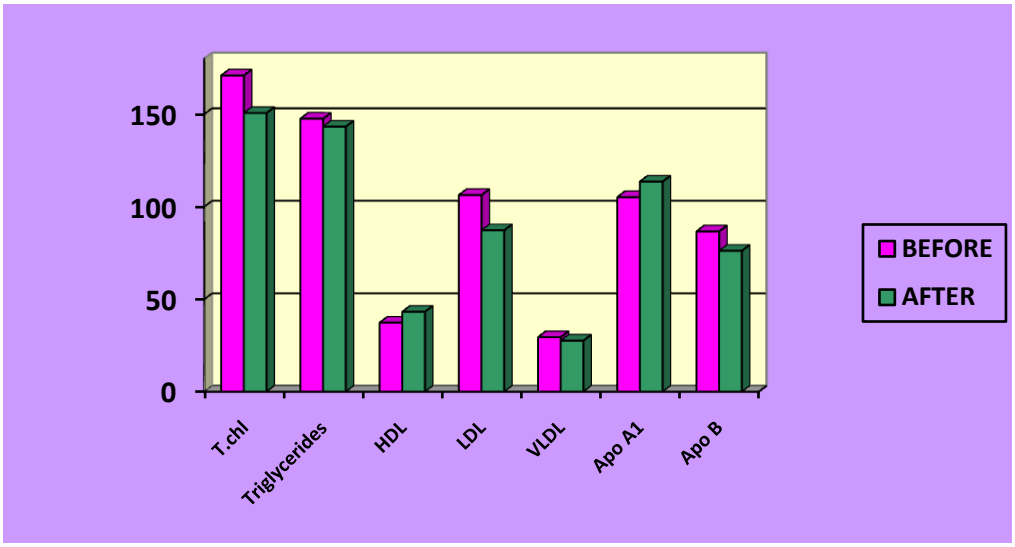
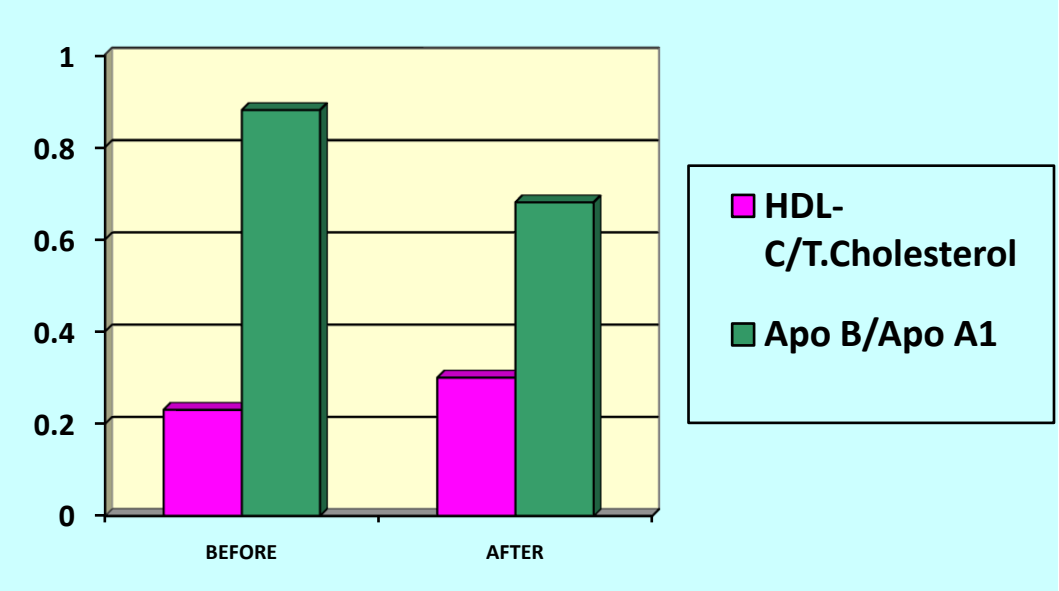


Figure II. Showing HDL-C/T.CHL and Apo B/Apo A1 Ratios in Healthy Subjects before and after Yogasanas and Pranayama



Discussion

The effect of exercise and dietary modifications on blood lipid profile and Coronary heart disease has been widely reported (**Prasad, et al, 2006**). The present study showed a significant fall in Total Cholesterol in healthy subjects practicing Yogasanas and pranayama. The studies conducted in western countries had reported a fall in Triglycerides and increase in HDL-C after physical activity (**Szapary, et al, 2003**). It is known that decreased concentrations of serum HDL-C lead to increased risk of Coronary heart disease whereas rise in its value exerts a protective effect (**Szapary, et al, 2003**). In this study there is a significant rise in HDL-C. The present study consisting of a low intensity muscle stretches and breathing practices had shown significant changes in the lipid profile and apolipoproteins at the end of the study (**Khare and Kawathekar, 2002**). Dhananjai S, et al., demonstrated the efficiency of Pranayamas and Yogasanas on lipid profiles in apparently healthy obese volunteers (**Dhananjai S et al,**

2011). The effect of yoga exercise on body mass showed a significant decrease in fat fold thickness and a significant rise in the lean body mass in normal subjects, which suggest that yoga and pranayama cause mobilization of fat deposits (**Khare & Kawathekar, 2002**). The improvement of lipid profile after yoga could be also 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 (Singh et al, 2008). It also believed that yoga practice causes gradual diminishing of sympathetic dominance, resulting in a better balance between the sympathetic and parasympathetic, hence better ability to overcome stress (**Dikshi etal, 2008**). This may also be the possible mechanism for the improvement in lipid profile, decrease in serum cholesterol and LDL-C observed in the present study. Apolipoproteins are protein components of lipoproteins. Apolipoprotein A1 and B are protein components of HDL-C and LDL-C,respectively. Hence, there is a significant rise in serum apolipoprotein A1 and fall in apolipoprotein B owing to concomitant rise in HDL-C & fall in LDL-C respectively in this study. There is significant rise in mean value of ratio of HDL-C/ T.CHL and fall in apo B/apo A1 after Yoga and Pranayama in this study.

Conclusion

The present study had demonstrated the health beneficial effects of Yogasanas and Pranayama on Lipid profile and Apolipoproteins in normal healthy subjects. Yogasanas and Pranayama practices may also be helpful in patients with lipid metabolism disorders such as Diabetes mellitus, Coronary Heart Disease and Dyslipidemia, and improves the quality of life.

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