Original Research Paper

Physiology

"COMPARATIVE ANALYSIS OF EFFECT OF PRACTICE OF YOGA, DIETARY CONTROL AND LOW DOSE ATORVASTATIN ON SERUM LDL IN NEWLY DIAGNOSED YOUNG DYSLIPIDEMIA PATIENTS".

Dr. Abha Gupta	Professor Department of Physiology I Q City Medical College & Hospital Durgapur - 713206 (W.B.)
Dr. Pansy Lyall*	Assistant Professor Department of Physiology I Q City Medical College & Hospital Durgapur -713206 (W.B.) *Corresponding Author

KEYWORDS : Dyslipidemia, Yoga practice, Lifestyle modifications, Atorvastatin.

Introduction:

With changing lifestyle, physical inactivity & dietary habits globally, persons are facing dyslipidemia at relatively younger age. The causal relation between hypercholesterolemia and atherosclerosis was established more than 80 years ago by Anitschkow.[1] Since the 1950s, there have been steady improvements in our ability to treat hypercholesterolemia through diet and the use of lipid-lowering drugs. Of all the forms of cholesterol in the blood, the LDL-C is considered the most important form in determining risk of heart disease. It is considered to be undesirable and is often call "bad" cholesterol because it deposits excess cholesterol in blood vessel walls and contributes to hardening of the arteries and heart disease. The earliest angiographic and clinical studies demonstrated that intensive therapy to lower low-density lipoprotein cholesterol (LDL-C) levels slowed the progression of atherosclerosis and decreased the incidence of major coronary events [2, 3]. HMG Coenzyme reductase Inhibitors are most commonly prescribed drugs in lowering of serum LDL in dyslipidemia patients. Those drugs have been associated with a beneficial impact on cardiovascular morbidities and mortality. As such, statins have become some of the most widely prescribed drugs in our country with many millions of patients taking them on a regular basis. Different oral hypolipedmic drugs available in basket of HMG Coenzyme Inhibitors are Atrovastatin, Rosuvastatin, Simavastatin etc. Atrovastatin is one of most commonly prescribed medicine for lowering serum LDL levels. However reports are coming of developing resistance or non responsiveness to stastins[4].

Besides HMG CoA enzyme inhibitors block the endogenous biogenesis of a necessary chemical compound, benzoquinone l0, needed for energy production. A deficiency of benzoquinone ten is related to impairment of heart muscle perform, with liver pathology and with myopathies including myocardiopathy and symptom heart failure). All patients taking HMG CoA enzyme inhibitors ought to thus be suggested to require 100 mg to 200 mg per day of supplemental benzoquinone ten.

Recent times have witnessed the alternative methods of reducing serum LDL thereby decreasing risk of cardiovascular morbidities & mortalities. These strategies involve general lifestyle changes (to promote healthy diet, optimal weight, physical activity, moderate or no alcohol consumption, and smoking cessation. India being a Vedic country, where yoga is practiced from centuries. Practice of yoga has been found to beneficial in keeping them healthy[5]. The yoga is emerging as greater role in modern treatment and prevention in different diseases & ailments. Yoga has given patients the hope to reduce medication besides slowing the progression of the disease[6, 7]. Among yoga asanas, Pranayama – kapalbhati is excellent way of controlling cholesterol. The right breathing technique improves the circulation of blood and enhances the intake of oxygen all over the body. It also helps the respiratory system to get rid of carbon dioxide, which reduces the impurities that are present in the blood. In this practices, there is a reduction of the unwanted chemical responses on the cholesterol molecules. Other effective yoga for cholesterol control poses and technique includes Surya namaskar and Shavasana.

Another approach accepted for control of dyslipidemia, is dietary control. According to the National Heart, Lung, and Blood Institute's (NHLBI) TLC Diet Guidelines, one should consume the following:

- Less than 7% of the day's total calories from saturated fat
- 25%-35% of the day's total calories from fat
- Less than 200 mg of dietary cholesterol a day
- Limit sodium intake to 2,400 mg a day
- Just enough calories to achieve or maintain a healthy weight and reduce the blood cholesterol level.

Objectives:

The objective of this present study the comparison between effects of yoga, dietary control and Low dose Atrovastatin on serum LDL level in newly diagnosed young dyslipidemia patients.

Methodology:

A single centre, open labelled, parallel, prospective study was conducted in IQ City Medical College & Hospital, Durgapur after obtaining permission from institute ethical committee. A total of Ninety patients of either sex with age group of 30-45 years visiting medicine OPD of the hospital were selected for the study. These patients have isolated increase of serum LDL levels from period not more than 6 months. Patients with co morbidities like hypertension, diabetes mellitus, coronary artery disease, peripheral vascular disease, hepatic diseases or carotid atherosclerosis were excluded from the study. Patients on any hypolipidemic drugs or history of smoking & alcoholism were too excluded from the study. The ninety patients were under study, were further divided in 3 groups: Group I (Practiced Yoga), Group II (Dietary control) and Group III (Low dose Atrovastatin). Informed written consent was obtained with all the patients and treatment modalities were explained to them.

- Group I patients were taught practice of yoga by a yoga expert (Table: 1) and advised to practice yoga for a session of 40 minutes daily. These patients were initially called for 5 days a week and then for once a week for 3 months.

Table 1: The yoga Schedule

S.No	Name	Duration
		30-40 min
1.	Bhastrika- pranayama	
2.	Kapal- bhati	
3.	Anuloma -vilom	
4.	Bhramari	
5.	Udgit-Om Uccharan	
6.	Surya namakar	
7.	Tadasana	
8.	Trikona-asana	
9.	Pashimottanasana	
10.	Bhujangasana	
11.	Shavasana	

- Group II patients were promoted to control their dietary habits including reduction in intake of saturated and Trans fats and increasing intake of polyunsaturated and monounsaturated fats along with limiting dietary cholesterol, lower total cholesterol, LDL cholesterol and sodium intake. They were advised to restrict energy requirement between 25%-35% of the day's total calories from fat.

- Group III were administered Tab Atrovastatin 10 mg daily at bed time.

Detailed history of the patients including age, gender, and disease history including duration and complications, treatment details including drug, dosage and duration of treatment were noted in the questionnaire. Body weight and height were measured using standard protocols with participants wearing light clothing without shoes. Body mass index (BMI) was calculated. Waist and hip circumferences were measured. The patients were advised to come fasting overnight and 5 ml blood samples were withdrawn from each patient under all aseptic conditions and collected in plain bottles. The fasting blood samples were analyzed for triglycerides (TG), total cholesterol (TC) and high-density lipoprotein–cholesterol (HDL–C). Cholesterol was estimated by modified Roeschlav's method and Triacylglycerol by the method of Wako modified by Mc Gowan et al. HDL cholesterol was assessed by phosphotungstic acid method. LDL cholesterol was not separately estimated but calculated from the formula: LDL cholesterol = Total cholesterol – [HDL cholesterol + TG/5].

Serum LDL level was measured on day 1 and day 90 to assess the benefits obtained from the study by ELISA method.

Statistical Methods: Categorical variables will be expressed as Number of patients and percentage of patients and compared across the groups using Pearson's Chi Square test for Independence of Attributes. Continuous variables will be expressed as Mean ± Standard Deviation and compared across groups using unpaired t test/One Way ANOVA if the data follows normal distribution and Mann-Whitney U test/Kruskal Wallis Test if the data does not follow normal distribution.

The statistical software SPSS version 20 will be used for the analysis. An alpha level of 5% has been taken, i.e. if any p value is less than 0.05 it will be considered as significant.

Observations & Results:

Table 2: Age, BMI of groups

	Group I	Group II	Group III	p value	Significance
Age	37.67+/- 4.33	38.4+/-5.74	37.7/-4.59	0.809	Non significant
Weight (kg)	60.97+/-9.23	66.1+/-7.46	63.13+/-6.54	0.043	Significant
Height (In Cm)	1.63+/-0.09	1.66+/-0.05	1.64+/-0.08	0.263	Non significant
BMI	22.83+/-2.12	23.92+/-2.53	23.56+/-2.66	0.218	Non significant

Table 3: Sex distribution among groups

		Group			Total	p Value	Significance
		GROUP I	GROUP II	GROUP III			
Sex	F	11(36.67)	11(36.67)	13(43.33)	35(38.89)	0.892	Not Significant
	M	19(63.33)	19(63.33)	17(56.67)	55(61.11)		
Total		30(100)	30(100)	30(100)	90(100)		

Table 4: Pre – Interventional & Post – Interventional Lipid Profile levels

	Group I	Group II	Group III	P value	Significance
Pre - Interventional					
Total Cholesterol	211.93+/-6.39	221.37+/-11.50	212.27+/-10.69	<0.001	Significant
HDL Cholesterol	55.03+/-5.10	56.93+/-4.48	55.13+/-4.58	0.221	Non significant
LDL Cholesterol	113.87+/-6.30	118.7+/-9.52	114.57+/-7.43	0.041	Significant
Triglycerides	214.53+/-16.27	228.07+/-22.75	212.8+/-16.79	0.004	Significant
Post - Interventional					
Total Cholesterol	188.07+/-9.84	201.03+/-11.47	192.7+/-11.0	<0.001	Significant
HDL Cholesterol	58.4+/-3.08	58.37+/-3.69	57.5+/-4.13	0.560	Non significant
LDL Cholesterol	92.23+/-8.01	101.57+/-10.79	95.7+/-7.27	<0.001	Significant
Triglycerides	186.27+/-14.46	205.83+/-21.29	197.77+/-18.87	<0.001	Significant

Table 5: Comparative Analysis of LDL –C of different groups

		Group			Total	p Value	Significance
		GROUP I	GROUP II	GROUP III			
Pre - Interventional S.LDL	Optimal	0(0)	1(3.33)	0(0)	1(1.11)	0.090	Not Significant
	Near optimal, above optimal	29(96.67)	23(76.67)	28(93.33)	80(88.89)		
	Borderline High	1(3.33)	6(20)	2(6.67)	9(10)		
Total		30(100)	30(100)	30(100)	90(100)		

		Group			Total	p Value	Significance
		GROUP I	GROUP II	GROUP III			
Post Interventional - S.LDL	Optimal	19(63.33)	9(30)	22(73.33)	50(55.56)	0.002	Significant
	Near optimal, above optimal	11(36.67)	21(70)	8(26.67)	40(44.44)		
Total		30(100)	30(100)	30(100)	90(100)		

Discussion:

As per American Heart Association guidelines, it is recommended that all adults above age of 20 years with no risk factors for heart disease should be tested every four to six years8. Guidelines from the American College of Cardiology and the American Heart Association recommend that adults taking statins have a fasting lipid profile done 4 to 12 weeks after starting therapy and then every 3 to 12 months thereafter to assure that the drug is working. Several large-scale clinical trials have assessed the efficacy of atorvastatin in the primary and secondary prevention of cardiovascular events in patients with diabetes mellitus and/or metabolic syndrome. In primary prevention, CARDS (Collaborative Atorvastatin Diabetes Study) showed that atorvastatin 10 mg/day (vs placebo) reduced relative risk of the composite primary endpoint (acute coronary heart disease [CHD] events, coronary revascularisation, or stroke) by 37% (p = 0.001). This decrease was similar to decreases in major cardiovascular events in the ASCOT-LLA (Anglo-Scandinavian Cardiac Outcomes Trial-Lipid Lowering Arm) trial and HPS (Heart Protection Study). However, in CARDS, atorvastatin efficacy was evident as early as 6 months after starting treatment[9].

According to the adult treatment panel III (ATP III) of National Cholesterol Education Program (NCEP)[10], if a person has no other risk factors, an LDL-C level can be evaluated as follows:

Table 6: Serum LDL-C levels and its Interpretation.

Serum LDL level	Interpretation
Less than 100 mg/dL (2.59 mmol/L)	Optimal
100-129 mg/dL (2.59-3.34 mmol/L)	Near optimal, above optimal
130-159 mg/dL (3.37-4.12 mmol/L)	Borderline High
160-189 mg/dL (4.15-4.90 mmol/L)	High
Greater than 189 mg/dL (4.90 mmol/L)	Very high

Conclusion:

In the present study it was observed that levels of serum LDL reduced stastically significant by 19%, 14% and 16% from pre intervention levels in group I, II and III respectively. Hence it may be safely interpreted that practice of yoga is an excellent tool in reducing serum LDL in newly diagnosed young dyslipidemic subjects with no co morbidities. However, use of low dose Tab Atrovastatin 10 mg is near equal effective who could not cope up with yoga due to different limitations.

REFERENCES
1. Anitschkow N. Über die Veranderungen der Kaninchenaorta bei experimenteller Cholesterinsteatose. Beitr Pathol Anat 1913;56:379-404.

2.   Lipid Research Clinics Program. The Lipid Research Clinics coronary primary prevention trial results. Reduction in incidence of coronary heart disease, JAMA 1984; 251:351-64.
3.   Brensike J, Levy R, Kelsey S, Passamani E, Richardson J, Loh I, et al. Effects of therapy with cholestyramine on progression of coronary atherosclerosis: results of the NHLBI Type II coronary intervention study. Circulation1984;69:124-31.
4.   Stefanutti C, Morozzi C, Di Giacomo S et al. New clinical perspectives of hypolipidemic drug therapy in severe hypercholesterolemia. Curr Med Chem. 2012; 19(28):4861-8.
5.   Bhunia, S. (2010). Can physical exercise, yoga, diet control and naturopathic treatment prevent progression of diabetes mellitus?, Indian Journal of Physiology and Pharmacology, V: 54, I: 1, P92-94
6.   Singh Savita, Tenzin Kyizom, K.P.Singh, O.P. Tandon and S V Madhu (2008). Influence of pranayama and yoga asanas on serum insulin, Blood glucose and lipid profile in type 2 diabetes. Indian journal of clinical Biochemistry. 23(4) 365-368.
7.   Dang K K., & Sahay B. K. (1999). Yoga and Meditation, Medicine Update, Volume 9, Part 1 Chapter 57 and 58, p 502 – 506, 507-512. The association of Physicians of India Ed M.M. Singh. APICON, The Association of Physician of India conference, New Delhi
8.   What Do My Cholesterol Levels Mean?" American Heart Association. September 2007. Retrieved 2009-11-14.
9.   Arca M, Atorvastatin efficacy in the prevention of cardiovascular events in patients with diabetes mellitus and/or metabolic syndrome. Drugs. 2007;67 Suppl 1:43-54.
10. Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) Executive Summary" (PDF). National Heart, Lung, and Blood Institute (NHLBI). National Institutes of Health. May 2001.