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Original Article

Effect of Lifestyle Variables (Physical Activity, Diet, and Body Mass Index) on the Lipid Profile of Individuals of Kolhan Region

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Abstract

Objective: To study the association between diet, exercise and obesity on the serum lipid profile.

Material and Method: The study was conducted in the department of physiology, MGM medical college and hospital, Jamshedpur. Hundred healthy participants comprised attendants of patient attending OPD of MGM Medical College and healthy volunteers (mainly staff) of the hospital in the age group 30- 50 years. They were observed to see the association between diet, physical activity and BMI on the serum lipid profile.

Conclusion: Body weight was significantly associated with TC, TG and LDL with *P* (<0.001). There was a partially significant difference in TC, TG and LDL level between sedentary workers and hard workers.

Key words: Body mass index, Total cholesterol, Triglyceride, Low-density cholesterol, Coronary artery disease

INTRODUCTION

A study from the United States in 1991 revealed that almost 60% of American adults had little or no leisure-time physical activity. Regular physical activity has been shown to reduce the coronary artery disease (CAD) risk in multiple epidemiological studies. A daily schedule of 30 min or more of moderately intensive physical activity has been advocated as an effective option to divert CAD risk.[1] The stress and strain of modern urban life adds to the dearth of physical activity to compound cardiovascular risk.[2]

It is important to encourage routine and spare time physical activity with the aim of expending at least 300 kcal/day.[3]

Several trials of the effect of dietary changes on CAD have suggested that altering the fatty acid composition of the diet in favor of greater intake of polyunsaturated fatty acids and less intake of saturated fats, while restricting the intake of fat calories to <30% of the total calories may lower the risk of subsequent development of CAD.[4] There is a well-established triangular relationship between habitual diet, blood cholesterol levels, and CAD.[5]

A vegetarian diet can be strongly cardioprotective, but the Indian vegetarian diet typically has large amount of saturated and trans fat, along with high glycemic carbohydrates and little fish, which has been suggested to be new risk factors of CAD. Diet rich in fish is associated with a decrease in the incidence of atherosclerosis due to the omega fatty acid content of fish.[6]

Obesity is a chronic condition characterized by an excess body fat. It is a risk factor for several chronic diseases including hypertension, dyslipidemia, diabetes, cardiovascular disease, sleep apnea, osteoarthritis, and some cancers. It is most often defined by body mass index (BMI). The healthy range of BMI is between 18.5 and 24.9; any BMI above this is considered overweight. Another parameter is waist-to-hip ratio (WHR); it provides information about the distribution of body fat. Women should have a WHR of <0.8, while men should have a ratio of 1.0 or less. The fat around your belly can increase your risk for type 2 diabetes and heart disease.[7]

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Therapeutic Lifestyle Changes in Low Dentistry Lipoprotein (LDL)-Lowering Therapy

ATP III (adult treatment panel III) recommends a multifaceted lifestyle approach to reduce risk for CAD. This approach is designated therapeutic lifestyle changes (TLC). Its essential features are as follows:

- Reduced intake of saturated fats (<7% of total calories) and cholesterol (<200 mg/dl).
- Therapeutic options for lowering LDL such as plant sterols (2g/d) and increased viscous (soluble) fibers (10–25 g/d).
- Weight reductions.
- Increased physical activity.[8]

MATERIALS AND METHODS

Blood samples were obtained after an overnight fast. About 5 ml of blood was collected from the left antecubital vein. Out of which about 2 ml is transferred into an OF vial and mixed well and centrifuged at a speed of 3000 revolutions/min for 10 min to separate the plasma, which was used for biochemical analysis. Rest 3 ml of blood is transferred to the test tube and this blood was allowed to clot to get serum. This serum was separated in a centrifuge tube at 3000 revolutions/min to get a clear sample of serum. This clear supernatant serum was used for biochemical investigation.

Estimation of Serum Total Cholesterol (TC)

Method – Enzymatic-colorimetric Trinder End point

The reagents were allowed to attain room temperature before use.

Pipette into tube marked	Blank	Standard	Sample
Reagent R	1000 µL	1000 µL	1000 µL
Standard	-	10 µL	-
Sample	-	-	10 µL

They were incubated for 5 min at 37°C and reading was done against blank at 500 nm and calculation was made. The concentration of cholesterol in the sample is directly proportional to the intensity of red complex (red quinone), which was measured at 500 nm.

Calculation

Cholesterol = Absorbance of sample/Absorbance of standard × Concentration of standard

Reference values: <200 mg/dl

Estimation of serum triglyceride (TG) method: Enzymatic-colorimetric method.

Contents were mixed and incubated for 5 min at 37°C. The reading was done against blank at 546 nm.

Pipette into tube marked	Blank	Standard	Sample
Reagent R	1000 µL	1000 µL	1000 µL
Standard	-	10 µL	-
Sample	-	-	10 µ

Calculation

Serum TG = Absorbance of sample/Absorbance of standard × n

n = Standard concentration

Reference values: >150 mg/dl.

Estimation of HDL Cholesterol

Method – Phosphotungstate method.

Principle – Chylomicrons, LDL, and VLDL are precipitated by addition of phosphotungstic acid and magnesium chloride. After centrifugation, the high-density lipoprotein (HDL) fraction remains in the supernatant is determined with CHOD-PAP method.

Reference value: >40mg/dl

Calculation of LDL and VLDL by Friedewald's Formula:

LDL = TC – (HDL + VLDL)

VLDL = TG/5

Reference value

LDL = Up to 190 mg/dl

VLDL = 14–31.8 mg/dl

BMI = Weight (kg)/height^2 (m^2)

WHR = Waist circumference/hip circumference.

Observation

TC, TG, and LDL showed a highly significant upper range in sedentary workers while HDL and VLDL showed partial variations between these two group

Lipid Level Varations among Obese and Non-obese

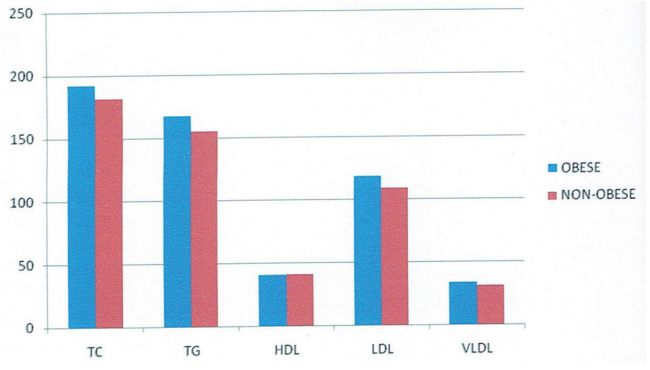

Table 1: Lipid level variations among hard workers and sendentary workers (mean±SD) in mg/dl

	Obese n = 60	Non-obese n= 40	t	P	Significance
Total cholesterol	192.06 ± 17.23	181.49 ± 22.34	3.71	<0.001	HS
Triglyceride	167.07 ± 16.67	155.22 ± 15.80	4.87	<0.001	HS
HDL	40.15 ± 6.61	41.09 ± 6.31	0.97	>0.5	NS
LDL	118.34 ± 18.29	108.88 ± 22.25	3.22	<0.001	HS
VLDL	33.41 ± 3.33	31.04 3.16	1.87	>0.5	NS

Definitely obese had a higher level of total cholesterol, triglyceride and LDL while HDL and VLDL levels were almost equal

Lipid Level Varations among Hard Workers and Sedentary Workers (mean in mg/dl)

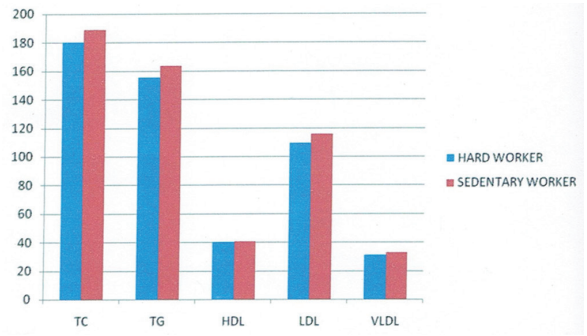

Table 2: Lipid level variations among hard workers and sendentary workers (mean±SD) in mg/dl

	Hard worker n = 60	Sedentary worker n = 40	t	p	Significance
Total cholesterol	180.29 ± 18.20	189.13 ± 19.62	1.983	<0.1	PS
Triglyceride	155.14 ± 15.41	163.39 ± 17.56	1.682	<0.1	PS
HDL	40.04 ± 6.56	40.61 ± 6.51	0.52	>0.1	NS
LDL	109.31 ± 20.18	115.84 ± 20.38	1.23	<0.1	PS
VLDL	31.05 ± 3.52	32.68 ± 3.30	0.60	>0.1	NS

Total cholesterol, triglyceride and LDL showed a partially significant higher level in sendentary workers while HDL and VLDL showed no variation between these two groups

DISCUSSION

Our findings provide support for the potentially significant effects of both diet and exercise on the serum lipid profile. The most important lifestyle factors which affect the serum lipid profile are diet composition, body weight, and physical activity. The modifications of blood lipid levels will be beneficial, especially to those who are at higher risk of CAD. Screening for these abnormalities is essential and must be followed by active and effective interventions. Combining campaigns to improve diet with efforts to increase physical activity may be needed to effectively reduce CAD risk.

Nutrient composition of therapeutic lifestyle change diet

Nutrient	Recommended intake
Saturated fat[1]	<7% of total calories
Polyunsaturated fat	Up to 10% of total calories
Monounsaturated fat	Up to 20% of total calories
Total fat	25 and 35% of total calories
Carbohydrate[2]	50–60% of total calories
Fiber	20–30 gm/day
Protein	Approximately 15% of total calories
Cholesterol	<200 mg/day
Total calories[3]	Balance energy intake and expenditure to maintain desirable body weight/prevent weight gain

[1]Transfatty acids are another LDL raising fat that should be kept at a low intake. [2]Carbohydrate should be derived predominantly from foods rich in complex carbohydrates including grains, especially whole grains, fruits, and vegetables. [3]Daily energy expenditure should include at least moderate physical activity contributing approximately 200 kcal/day

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