

LOW-CARBOHYDRATE VERSUS LOW-FAT DIET COMBINED WITH EXERCISE TRAINING ON BLOOD LIPID PROFILE IN OBESE FEMALES

Thesis

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Presented By

Walid Kamal Mohamed Abd El Basset

B.Sc., (2001) in Physical Therapy Department of
Physical Therapy for Cardiovascular / Respiratory Disorder and Geriatrics

Supervisors

Prof. Dr. Nagwa Mohamed Badr

Professor of Physical Therapy
Faculty of Physical Therapy
Cairo University

Prof. Dr. Aziz Guirguis Aziz

Professor of Physical Therapy
Faculty of Physical Therapy
Cairo University

Ass. Prof. Dr. Mahmoud Mohamed Mahfouz

Ass. Professor of Internal Medicine
Faculty of Medicine, Cairo University

**Faculty of Physical Therapy
Cairo University
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Abstract

Forty five obese females aged 20-32 years are included in the present study. Their BMI ranged between (35 to ≥ 40). They were classified into three groups each group consists of fifteen subjects, the first group was those on Low-carbohydrate diet (1500 cal/d, 38.7g CHO/d) with aerobic exercise (40 min. walking Ex. 3 times/week), the second was those on Low-fat diet (1500 cal/d, 16.9g fat/d) with the same aerobics and the third group was those on aerobic exercise only (control group). The biochemical changes in serum (total cholesterol, TG, LDLs and HDLs) were measured at the beginning of the study and after twelve weeks. The results showed that low-carbohydrate diet had greater effect to decrease in serum triglycerides (-18.1mg/dL; $P < 0.05$ vs. -6.1 mg/dL; $P > 0.05$) and greater increase in HDLs (+3.431mg/dL; $P < 0.05$ vs. +1.93 mg/dL; $P > 0.05$) when compared with low-fat diet. Changes of Total cholesterol and LDLs levels did not differ statistically between the three groups ($P < 0.05$).

Key words; (Low-carbohydrate, Low-fat, BMI, Cholesterol, Triglyceride, LDLs, HDLs).

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List of Abbreviations

AACE:	American Association of Clinical Endocrinologists
AHA:	American Heart Association
BMI:	Body Mass Index
BMR:	Basal Metabolic Rate
CETP:	Cholesterol Ester Transfer Protein
CHol:	Cholesterol
CHD:	Coronary Heart Disease
CT:	Computed Tomography
CVD:	Cardiovascular Disease
DEXA:	Dual Energy X-Ray Absorptiometry
FDA:	Food and Drug Administration
HDLs:	High Density Lipoproteins
HERITAGE:	The Health, Risk Factors, Exercise, Training and Genetics
HL:	Hepatic Lipase
HMG:	Hydroxy-3- Methyl Glutaryl
HPTG:	Hypertriglyceridemia
HSP-70:	The Heat Shock Protein 70
HSPGs:	Heparan Sulfate Proteoglycans
IDLs:	Intermediate Density Lipoproteins
IMNA:	Institute of Medicine of the National Academies
LCAT:	Lecithin: Cholesterol Acyl Transferase
LDLs:	Low Density Lipoproteins
LoCHO D:	Low-Carbohydrate Diets
LPL:	Lipoprotein Lipase
MRI:	Magnetic Resonance Imaging
MTP:	Microsomal Triglyceride Protein

MUFAs:	Monounsaturated Fatty Acids
NCEP:	National Cholesterol Education Program
NEFA:	Non Esterified Fatty Acids
NEJM:	National England Journal Of Medicine
NHANES:	National Health and Nutrition Examination Survey
NIH:	National Institute Of Health
RER:	The Rough Endoplasmic Reticulum
SER:	The Smooth Endoplasmic Reticulum
SR-BI:	Scavenger Receptor Class B, Type I
TG:	Triglyceride
TNF:	Tumor Necrosis Factor
TRLs:	Triglyceride-Rich Lipoproteins
USPSTF:	US Preventive Services Task Force
VLDLs:	Very Low Density Lipoproteins
WHOs:	World Health Organizations
WIN:	Weight-Control Information Network

Definitions of Terms

Cardiovascular disease (CVD): Any abnormal condition characterized by dysfunction of the heart and blood vessels. CVD includes atherosclerosis (especially coronary heart disease, which can lead to heart attacks), cerebrovascular disease (e.g., stroke), and hypertension (high blood pressure).

Cholesterol: A soft, waxy substance manufactured by the body and used in the production of hormones, bile acid, and vitamin D and present in all parts of the body, including the nervous system, muscle, skin, liver, intestines, and heart. Blood cholesterol circulates in the bloodstream. Dietary cholesterol is found in foods of animal origin.

Computed tomography (CT) scans: A radiographic technique for direct visualization and quantification of fat that offers high image contrast and clear separation of fat from other soft tissues. CT can estimate total body adipose tissue volume and identify regional, subcutaneous, visceral, and other adipose tissue depots. Radiation exposure, expense, and unavailability restrict the epidemiologic use of CT.

Dyslipidemia: disorders in the lipoprotein metabolism; classified as hypercholesterolemia, hypertriglyceridemia, combined hyperlipidemia, and low levels of high-density lipoprotein (HDL) cholesterol. All of the dyslipidemia can be primary or secondary. Both elevated levels of low-density lipoprotein (LDL) cholesterol and low levels of HDL cholesterol predispose to premature atherosclerosis.

Energy balance: Energy is the capacity of a body or a physical system for doing work. Energy balance is the state in which the total energy intake equals total energy needs.

High – density lipoproteins (HDL): Lipoproteins that contain a small amount of cholesterol and carry cholesterol away from body cells and tissues to the liver of excretion from the body. Low-level HDL increases the risk of heart disease, so the higher the HDL level, the better. The HDL component normally contains 20 to 30 percent of total cholesterol, and HDL levels are inversely correlated with coronary heart disease risk.

Hypercholesterolemia (high blood cholesterol): Cholesterol is the most abundant steroid in animal tissues, especially in bile and gallstones. The relationship between the intake of cholesterol and its manufacture by the body to its utilization, sequestration, or excretion from the body is called the cholesterol balance. When cholesterol accumulates, the balance is positive; when it declines, the balance is negative.

Hypertriglyceridemia: An excess of triglycerides in the blood (between 400 and 1,000 mg/dL), that is an autosomal dominant disorder with the phenotype of hyperlipoproteinemia, type IV.

Lipoprotein: Protein-coated packages that carry fat and cholesterol throughout the bloodstream. There are four general classes: high-density, low-density, very low-density, and chylomicrons.

Low-density lipoprotein (LDL): Lipoprotein that contains most of the cholesterol in the blood. LDL carries cholesterol to the tissues of the body, including the arteries. A high level of LDL increases the risk of heart disease. LDL typically contains 60 to 70 percent of the total serum cholesterol and both are directly correlated with CHD risk.

Macronutrients: Nutrients in the diet that are the key sources of energy, namely protein, fat, and carbohydrates.

Magnetic resonance imaging (MRI): Magnetic resonance imaging uses radio frequency waves to provide direct visualization and quantification of fat. The sharp contrast of MRI allows clear separation of adipose tissue from surrounding non-lipid structures. Essentially the same information provided by CT is available from MRI, including total body and regional adipose tissue, subcutaneous adipose, and estimates of various visceral adipose tissue components.

Meta-analysis: process of using statistical methods to combine the results of different studies. A frequent application is pooling the results from a set of randomized controlled trials, none of which alone is powerful enough to demonstrate statistical significance.

Monounsaturated fat: An unsaturated fat that is found primarily in plant foods, including olive and canola oils.

Polyunsaturated fat: An unsaturated fat found in greatest amounts in foods derived from plants, including safflower, sunflower, corn, and soybean oils.

Saturated fat: A type of fat found in greatest amounts in foods from animals, such as fatty cuts of meat, poultry with the skin, whole-milk dairy products, lard, and in some vegetable oils, including coconut, palm kernel, and palm oils. Saturated fat raises blood cholesterol more than anything else eaten.

Sleep apnea: A serious, potentially life-threatening breathing due to either collapse of the upper airway during sleep or absence of respiratory effort.

Triglyceride: A lipid carried through the bloodstream to tissues. Most of the body's fat tissue is in the form of triglycerides, stored for use as energy. Triglycerides are obtained primarily from fat in foods.

Very low-density lipoprotein (VLDL): The lipoprotein particles that initially leave the liver, carrying cholesterol and lipid. VLDLs contain 10 to 15 percent of the total serum cholesterol along with most of the triglycerides in the fasting serum; VLDLs are precursors of LDL, and some forms of VLDL, particularly VLDL remnants, appear to be atherogenic (**National Institute of Health, 2000**).

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