APOPROTEINS IN OBESITY

Thesis

Submitted for partial fulfillment

of Master degree of internal medicine

By

ASHRAF ABDEL MONEM AWWAD

(M.B., B. Ch)

Supervisors

PROF. DR. MOATASSEM SALAH AMER

Prof. of Internal Medicine

Faculty of Medicine

Ain Shams University

PROF. DR. MOHSEN MAHER

Prof. of Internal Medicine

Faculty of Medicine

Ain Shams University

DR. NIVIN KASSEM

Lecturer of Clinical pathology

Faculty of Medicine

Ain Shams University

Faculty of Medicine

Ain Shams University

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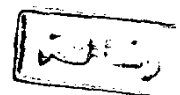# APOPROTEINS IN OBESITY

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بسم الله الرحمن الرحيم

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إقرأ باسم ربك الذى خلق (١) خلق الإنسان

من علق (٢) إقرأ وربك الأكرم (٣) الذى علم

بالقلم (٤) علم الإنسان ما لم يعلم (٥)

صدق الله العظيم

العلق آية (١-٥)

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LIST OF TABLES AND FIGURES

ABBREVIATIONS

Apo A	apolipoprotein A
Apo B	apolipoprotein B
Apo C	apolipoprotein C
Apo D	apolipoprotein D
Apo E	apolipoprotein E
Apo F	apolipoprotein F
Apo G	apolipoprotein G
Apo H	apolipoprotein H
BMI	Body mass index
CE	cholesteryl esters
CEEP	cholesteryl ester exchange protein
HDL-C	High density lipoprotein - cholesterol
IDL-C	Inter mediate density lipoprotein-cholesterol
LDL-C	Low density lipoprotein - cholesterol
LP (a)	lipoprotein (a)
LP (x)	lipoprotein (x)
LPS	lipoproteins
NIDDM	Non insulin dependent diabetes mellitus
PAI	plasminogen activator inhibitor
STR	subscapular - triceps skin fold ratio
TG	trigly cerides
VLDL	very low density lipoprotein
WHR	waist hip circumference ratio

CONTENTS

INTRODUCTION

INTRODUCTION AND AIM OF WORK

Introduction :

✗ The possible relation between obesity and cardiovascular disease has been the subject of great controversy. The role of obesity per se as an independent risk factor for coronary heart disease has not been clearly established. There is overwhelming evidence, based on a large body of pathologic, angiographic and epidemiologic data, that obesity plays no role in the prevalence of coronary disease in a population at risk, especialy if age, blood pressure, serum cholesterol and smoking habits are considered. On the other hand, the increased coronary mortality observed in markedly obese subjects particularly in middle-aged group, indicates that obesity at this level of factors associated with it accelerate the development or progression of coronary heart disease *(Alexander, 1985)*.

There are several lines of investigation that relate to possible linkages between metabolic alterations in obesity and coronary disease that have revealed no well defined mechanisms. While the atherogenic potential that is associated with elevated total serum cholesterol and reduced HDL-C level is high, their association with obesity is weak. Hypertension is now the only entity predisposing patients to coronary disease that is clearly associated with obesity *(Alexander, 1985)*.

Hypercholesterolaemia and hypertriglyceridaemia have long been recognised as common accompaniments of coronary heart disease and frequently have a genetic basis. The predictive value of serum total

cholesterol is, however, limited by the fact that it reflects the opposing influences of LDL-C cholesterol and HDL-C cholesterol, the former correlating positively and the latter negatively with coronary heart disease. The negative correlation between HDL-C and coronary heart disease appears to depend mainly on its minor subfraction, HDL_2, and it has been proposed that the latter provides an even better index of risk than does total HDL-C. Analysis of the small amount of cholesterol in HDL_2 can now be achieved using a relatively simple precipitation method but has the drawback that even slight analytical errors severely bias the estimate of risk.

Recent evidence suggests that determining the number of LDL-C and HDL-C particles present in plasma by measuring the concentration of their respective apoproteins, apo B and apo A-I, discriminates better between patients with and without coronary heart disease than does quantitating the amount of cholesterol these particles carry *(Thompson, 1984)*.

Aim of work :

So the aim of this work is to study changes in apoproteins which may explain changes in lipid metabolism in obesity that may be linked to an increased risk for premature atherosclerosis and coronary heart disease.

Introduction

REVIEW OF LITERATURE

CHAPTER 1

PLASMA LIPIDS

Introduction and importance of lipids :

Lipids are a heterogenous group of compounds related, either actually or potentially, to the fatty acids. They have the common property of being insoluble in water, soluble in non polar solvents such as ether , chloroform and benzene . Thus the lipids include fats, oils, waxes and related compounds .

Lipids are important dietary constituents not only because of their high energy value but also because of the fat - soluble vitamins and the essential fatty acids contained in the fat of natural foods .

In the body, fat serves as an efficient source of energy, both directly and potentially when stored in adipose tissue . It serves as athermal insulator in the subcutaneous tissues and arround certain organs, and non polar lipids act as electrical insulators allowing rapid propagation of depolorization waves along the myelinated nerves .

The fat content of nerve tissue is particularly high . Combination of fat and protein (lipoprotein) are important cellular constituents, occuring both in the cell membrane and in the mitochondria within the cytoplasm, and Serving also as the means of transporting lipids in blood *(Mayes, 1993)*.

Classification :

The following classification of lipids is modified from Bloor :

A- Simple lipids :

These are esters of fatty acids with various alcohols. They include neutral fats and waxes .

a) ***Fats*** *:* These are esters of fatty acids with glycerol. A fat in the liquid state is known as an Oil .

b) ***Waxes*** *:* Esters of fatty acids with higher molecular weight monohydric alcohols; they include :

- True waxes, which consist of products of both animal and plant origin .
- Cholesterol esters : These are fatty acids esters of cholesterol .
- Vitamine A esters : Vitamine A occurs naturally as palmitic or stearic acid esters .
- Vitamine D esters .   *(Mayes , 1993)*.

B- Complex lipids :

These are esters of fatty acids containg groups in addition to an alcohol and a fatty acid . They include the following :

i- Phospholipids : lipids containing in addition to fatty acids and an alcohol, a phosphoric acid residue. They frequently have nitrogenous base and other substituents.

ii- Glycolipids : [Glycosphingolipids] these are lipids containing a fatty acid, sphingosine, and a carbohydrate .

iii- Other complex lipids : lipids such as sulpholipids, aminolipids and lipoproteins.

_____ *Review*