

STUDY OF PLASMA LIPIDS AND
LIPOPROTEINS IN HYPERTENSION
AND EFFECTS OF SOME
HYPOTENSIVE DRUGS ON ITS
LEVELS

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF
THE MASTER DEGREE IN
GENERAL MEDICINE

BY

ESAM KHAMES DESOKY

(M.B., B.Ch.)

SUPERVISORS

DR. IBRAHIM ABD ALLAH

ASSIST.PROF. OF GENERAL MEDICINE

AIN SHAMS UNIVERSITY

DR. IBRAHIM KHALEL ALI

ASSIST.PROF. OF CLINICAL PATHOLOGY

AIN SHAMS UNIVERSITY

FACULTY OF MEDICINE
AIN SHAMS UNIVERSITY

1987



« علم الانسان ما لم يعلم »

صدق الله العظيم

سورة العلم آية ٥



CONTENTS

	Page
* INTRODUCTION AND AIM OF THE WORK.....	1
* REVIEW OF LITERATURE	
1. Hypertension.....	3
2. Plasma lipids and lipoproteins.....	24
- Hyperlipoproteinaemias.....	44
- Role of lipoproteins in atherosclerosis.....	55
3. Hypertension and plasma lipids and lipoproteins.....	60
4. Effects of antihypertensive therapy on plasma lipids and lipoproteins.....	65
- Adrenergic control of lipid metabolism	92
- Mechanisms of lipid changes during antihypertensive therapy.....	93
* MATERIALS AND METHODS.....	100
* RESULTS.....	104
* DISCUSSION.....	127
* SUMMARY AND CONCLUSION.....	135
* REFERENCES.....	137
* ARABIC SUMMARY.....	

* * *

INTRODUCTION
AND
AIM OF THE WORK

INTRODUCTION
AND
AIM OF THE WORK

Among the major risk factors associated with coronary heart disease, hypertension and disorders of plasma lipids are the most important. [Castelli, 1984]. Plasma levels of total cholesterol and LDL cholesterol are positively correlated [Eliasson et al., 1981] and that HDL cholesterol levels are inversely related [Miller and Miller, 1975] to the risk of developing coronary heart disease.

Essential hypertension is accompanied by increased occurrence of hyperlipoproteinemias as compared with the corresponding control groups [Tokar, et al., 1985].

In a previous study it was reported that, more than 40 percent of untreated hypertensive subjects had elevated levels of total plasma cholesterol, total to HDL cholesterol ratios and triglycerides in comparison with less than 30 percent of normotensive subjects. LDL cholesterol levels were also greater in women with untreated hypertension than in normotensives but in both men and women there was no difference in HDL cholesterol levels between untreated hypertensive and normotensive subjects [MacMahon and MacDonald, 1986]. The tendency for persons with hypertension to have elevated plasma lipoprotein levels has also been observed

in other studies [Maxwell et al., 1983 and Leren et al., 1982].

In many studies, various classes of antihypertensive drugs have been found to alter plasma lipid and lipoprotein levels in different ways [Weinberger, 1985, Neusy and Lowenstein, 1986 and Velasco et al., 1986].

So the aim of this work is to study the plasma lipids and lipoproteins in hypertensive patients and the effect of some antihypertensive drugs on its level.

* * *

**REVIEW
OF
LITERATURE**

17

HYPERTENTION

DEFINITION

The systemic arterial pressure is the driving pressure of the capillary circulation throughout the body. Pathological increase in the arterial pressure is an abnormality which is difficult to define at present in absence of reliable criteria for normality. The operational definition of hypertension is the level at which the benefits of action exceed those of inaction [Rose, 1980].

In fact the usually accepted values [WHO values] are only average results found in presumably healthy subjects. There is no indication that the normal values are absolute [Dollery, 1985].

Kannel et al., (1971) defined hypertension as arterial pressures in excess of 160 mmHg systolic and 105 mmHg diastolic.

Hypertension in the adult is defined by most authorities and by the American Health Association as the arterial pressure exceeding 140/90.

The World Health Organisation has recommended the following criteria for arterial blood pressure:

1. Below 140 mmHg systolic, 90 mmHg diastolic (Normotension).
2. 160 mmHg systolic, 95 mmHg diastolic and above. (Hypertension).
3. Intermediate group (140 systolic, 90 diastolic to 159 mmHg systolic, 94 mmHg diastolic) has been referred to as (borderline or possible hypertension).

[Norman and Ellin, 1982]

There is no sharp dividing line between normal and elevated blood pressure [Paul and Braunwald, 1977].

A wide range of blood pressure values is found among human population [Dollery, 1983]:

- * In women, the values are 10 mmHg less expect during pregnancy when they normally fall initially, and increase again slowly during the last trimester without ever exceeding 130/80 mmHg.
- * In elderly people of more than sixty-five to seventy years of age slightly higher values are common (systolic pressure between 160-170 mmHg are considered as normal, the diastolic pressure is less than 100 mmHg).
- * In the other extreme of life, normal values are difficult to evaluate and one had to refer to distribution curves of arterial pressure in function of age

which show only the mean value found in a population considered to be normal.

CLASSIFICATION

I. Classification according to the course of hypertensive states :

1. Benign hypertension:

Occurs in old subjects in whom the pressure is not so high. The patient's condition remains relatively stable for years, but death may occur either due to heart failure or stroke. Retinopathy when present shows the picture of arteriosclerotic retinopathy and exudates which are small, sharply defined and often confined to one eye. [Dollery, 1985].

2. Malignant hypertension:

Occurs at any age, but is more frequently present in the young age, here, the blood pressure is very high and it is characterised by neuroretinopathy and rapid decline in the renal function.

It is rarely arise de novo but commonly on top of primary or secondary hypertension.

Criteria of malignant hypertension:

- Sudden onset and rapid progression.
- The level of diastolic pressure is 130 mmHg or more.

- The fundus examination show exudates, haemorrhage and papilloedema.
- Rapid decline in the renal function.

[Dollery, 1985]

II. Classification according to the level of blood pressure:

1. Borderline hypertension: Blood pressure between 140 / 90 and 159/94 mmHg.
2. Mild hypertension: Diastolic blood pressure between 95-104 mmHg.
3. Moderate hypertension : Diastolic blood pressure between 105-119 mmHg.
4. Severe hypertension: Diastolic blood pressure 120 mmHg or more.

[Norman and Ellin, 1982]

III. Epidemiologic classification:

The epidemiologic classification serves only to differentiate normotensive from hypertensive patient in a field of study. [Dollery, 1985].

IV. Therapeutic classification:

The National High Blood Pressure Education Program in 1973 in the United States, (Pickering, 1973), classified hypertension whether the subject requires treatment or does not.

Subjects with blood pressure below 140/90 mmHg don't require treatment, subjects with initial diastolic blood pressure above 95 mmHg and another reading below 95 mmHg don't require treatment too. Diastolic blood pressure between 95-105 mmHg for two readings requires observation and decision for treatment is individualized. Finally all patients with diastolic blood pressure of 105 mmHg or above require treatment.

V. Aetiological classification :

1. Systolic hypertension :

In this type the systolic pressure is only raised. Systolic blood pressure is determined by two factors:

- Stroke volume.
- Compliance of the aorta and its branches.

A. Any condition increases the stroke volume may raise systolic pressure as in :

- Bradycardia with complete heart block.
- Aortic incompetence.
- Arterio-venous fistula.
- Patent ductus arteriosus.
- Severe anaemia.
- Paget's disease of bone.
- Thyrotoxicosis.
- Fevers.
- Pregnancy.

B. Also a decrease in compliance i.e reduction in

elasticity of the aorta and its branches will
increases the systolic pressure as in :

- Degenerative changes of the media as seen in old age and diabetes.
- Increased thickness of the wall as in Atheroma.

[Pickering, 1973].

2. Diastolic hypertension :

Diastolic blood pressure is primarily determined by the total peripheral vascular resistance , predominantly regulated by the resistance of small arteries and arterioles. The prevalence of elevated diastolic blood pressure in the general population peaks between age of 50 and 55 years and then declines. [Hickler, 1980].

3. Combined systolic and diastolic hypertension:

This type can be divided into two main groups:

a) Essential Hypertension (Primary Hypertension):

Refers to such cases in which after complete medical evaluation exhibits no abnormality as regards the cause. It constitutes about 80% of hypertensive patients (Kaufman et al.,1971).

b) Secondary Hypertension:

That which is presumed or proved to be due to a demonstrable primary disease.

It can be classified into the following types:
[Causes of secondary hypertension].

1. Renal hypertension:

a) Renovascular hypertension:

1. Renal artery stenosis.
2. Renal infarction.
3. Renal arterial aneurysm.
4. Renal arteriovenous fistula.

b) Renal parenchymal hypertension:

1. Acute and chronic glomerulonephritis.
2. Chronic pyelonephritis.
3. Polycystic kidney diseases.
4. Radiation nephritis.
5. Renal involvement associated with systemic disease e.g diabetic nephropathy, gouty nephropathy and collagen vascular diseases.
6. Other primary renal parenchymal disease.

2. Adrenal hypertension:

- a) Primary aldosteronism.
- b) Cushing's syndrome.
- c) Congenital adrenogenital syndrome.
- d) Pheochromocytoma.

3. Neurogenic hypertension:

- a) Rapidly rising intracranial pressure.
(cerebral haemorrhage, heat trauma, lead encephalopathy)
- b) Bulbar poliomyelitis.
- c) Acute intermittent porphyria.
- d) Guillain-Barre syndrome.