

The impact of hyperinsulinemia on the heart in hypertensive elderly

Thesis

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By

Walaa Wessam Aly Mahrous

Master of Geriatrics

Faculty of Medicine, Ain Shams University

Supervised by

Professor Ahmed Kamel Mortagy

Professor of Geriatrics

Faculty of Medicine, Ain Shams University

Doctor Randa Ali-Labib

Assistant Professor of Biochemistry department

Faculty of Medicine, Ain Shams University

Doctor Hala Samir Sweed

Lecturer of Geriatrics

Faculty of Medicine, Ain Shams University

Doctor Somaia Mohammed Ebeid

Lecturer of Geriatrics

Faculty of Medicine, Ain Shams University

**Faculty of Medicine
Ain Shams University**

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Introduction

The overall prevalence of hypertension is 26.4% of the adult population in 2000 and 29.2% are projected to have this condition by 2050 (*Kearney et al 2005*).

The estimated total number of adults with hypertension in 2000 is 972 million; 333 million in economically developed countries and 639 million in economically developing countries. The number of adults with hypertension in 2025 is predicted to increase by about 60% to a total of 1.56 billion (*Kearney et al 2005*).

Narvaez, et al 2001 have found statistically significant differences, comparing the percentage of cardiovascular diseases among hypertensives (33.1 %) and normotensives (10.6 %), being the risk 4.16 times higher in elderly hypertensives.

Hyperinsulinemia, overweight, impaired glucose tolerance, low serum high-density lipoprotein (HDL) and high triglyceride levels are more frequently found in patients with essential hypertension than normotensive subjects, regardless of gender, age and ethnic background (*Ferrannini, et al 1991*)

Insulin resistance and hyperinsulinemia are important risk factors for the development of hypertension, atherosclerotic heart diseases, left ventricular hypertrophy and dysfunction, and heart failure (*Coats and Anker 2001*)

Hyperinsulinemia, and insulin resistance could raise blood pressure through direct effect on vascular tone, stimulation of the adrenergic nervous system and antinatriuresis (*Trovati, et al 1995*)

Makuyana, et al 2004 found significant associations between hyperinsulinemia and the metabolic syndrome (including hypertension), as well as between hyperinsulinemia and obesity ,also it was found that patients exhibiting three metabolic disorders (dyslipidaemia, hypertension and obesity) were 5 times more likely to be hyperinsulinemic and that hypertensive patients were almost 3 times more likely to be hyperinsulinemic.

The relationship between blood pressure, hyperinsulinemia, and insulin resistance is complex. however, a 1 Standard deviation decrease in insulin sensitivity would predict a 2-mmHg increase in diastolic blood pressure after adjusting for age, gender and body mass index (*Ferrannini, et al 1997*)

Vaccaro, et al 2003 found that there is substantial but not conclusive evidence that insulin resistance is related to left ventricular mass in hypertensive individuals.

Yanase, et al 2004 found that fasting hyperinsulinemia and high insulin resistance increased the risk of new cardiovascular event in patients with normal glucose tolerance and coronary artery disease.

Aim of the work

The aim of this work is to detect impact of hyperinsulinemia on the heart in hypertensive elderly

Patients and Methods

Study design:

Cross-sectional study

Sampling:

150 hypertensive nondiabetic patients aging 60 years and more will be selected from the inpatients Geriatric Department of Ain Shams University hospital.

Methodology:

All subjects will be subjected to the following:

1. Comprehensive Geriatric Assessment
2. Laboratory investigations which include:
 - a- Fasting blood glucose and 2 hours postprandial blood glucose levels.
 - b- lipid profile which includes total cholesterol, high-density lipoprotein (HDL), low-density lipoprotein (LDL) and triglycerides levels
 - c- Fasting blood insulin level
3. Echocardiography and electrocardiography
 - a- Careful history taking
 - b- Thorough clinical examination
 - c- Mini-Mental State Examination (MMSE).
 - d- Geriatric Depression Scale (GDS).
 - e- Activity of daily living (ADL)
 - f- Instrumental activity of daily living (IADL)

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I

المقدمة

لقد وجد أن معدل حدوث مرض ارتفاع ضغط الدم قد سجل نسبة 26.4 % في عام 2000 ميلادية ، و إن عدد الأفراد المصابين بارتفاع ضغط الدم لعام 2000 سجل 972 مليون فرد و من المتوقع أن تزداد نسبة الإصابة بهذا المرض بمعدل 60 % ليصل العدد إلى 1.56 بليون مصاب بحلول عام 2025 ميلادية .

لقد وجد أن معدل حدوث امراض القلب لدى مرضى ارتفاع ضغط الدم قد سجل نسبة 33.1 % مقارنة بالأصحاء الذين تبلغ نسبة الاصابة لديهم 10.6 %

إن ارتفاع نسبة السمنة و ارتفاع نسبة هرمون الأنسولين بالإضافة إلى ارتفاع نسبة الدهون الثلاثية في الجسم ، تكون أكثر تواجداً لدى مرضى ارتفاع ضغط الدم مقارنة بمعدلاتها لدى الأصحاء .

لقد وجد أن ارتفاع نسبة هرمون الأنسولين يؤدي إلى ارتفاع ضغط الدم عن طريق التأثير المباشر على الأوعية الدموية أو عن طريق حث الجهاز العصبي السمبثاوي .

و من المعلوم إن زيادة هرمون الأنسولين من أهم العوامل المؤدية إلى ارتفاع ضغط الدم و تصلب شرايين القلب و حدوث تضخم و فشل في عضلة القلب ، بالإضافة إلى إن تضخم عضلة القلب له علاقة وطيدة بالسمنة و ارتفاع ضغط الدم .

الهدف من البحث

دراسة تأثير زيادة هرمون الأنسولين على القلب لدى المسنين المصابين بارتفاع ضغط الدم .

طريقة عمل البحث

سوف نقوم باختيار عينة من المرضى يبلغ عددهم 150 مريضاً من كبار السن الذين يعانون من ارتفاع ضغط الدم و ليس لديهم ارتفاع في نسبة السكر بالدم و سيتم اختيار أفراد العينة من المرضى المحجوزين بقسم طب و صحة المسنين بمستشفيات جامعة عين شمس0

التقييم و الفحص :

سوف نقوم بعمل التالي :

- سوف يتم أخذ التاريخ المرضي لأفراد العينة مع عمل فحص شامل لهم .
- سيتم قياس النسب التالية (نسبة هرمون الأنسولين في الدم - نسبة السكر في الدم - نسبة الدهون في الدم)
- عمل موجات صوتية على القلب بالإضافة إلى رسم القلب .

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LIST OF ABBREVIATIONS

ACEIs	Angiotensin converting enzyme inhibitors
ADL	Activities of Daily Living
AN	Acanthosis nigricans
ASE	American Society of Echocardiography
BMI	Body mass index
BP	Blood pressure
CHD	Coronary heart disease
CVD	Cardiovascular disease
CVE	Cardiovascular Events
CVS	Cerebrovascular stroke
DBP	Diastolic blood pressure
DM	Diabetes mellitus
ECG	Electrocardiography
EDD	End diastolic diameter
EF	Ejection fraction
ESD	End systolic diameter
FFA	Free fatty acid
FPG	Fasting plasma glucose
HDL-C	High density lipoproteins-cholesterol
HOMA-IR	homeostasis model assessment; insulin resistance
HOT	Hypertension Optimal Treatment
HTN	Hypertension