

Biochemical Studies of Ghrelin and Leptin Levels in Obese Conditions with Body Mass Index and Insulin Resistance

Presented by

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ABSTRACT

Name : Hamed Mohamed Hamed Khalil Abou Ismael

**Title of Thesis: Biochemical studies of ghrelin and leptin levels in obese individuals
relationship with body mass index and insulin resistance**

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Abstract:

This study aimed to investigate the levels of some common orexigenic agents and obesity. We focused on some human hormones such as ghrelin, leptin and insulin resistance in serum of over-weight, obese and normal weight Egyptian females.

Results: The level of serum human ghrelin hormone was significant decreased in both over-weight and obese individuals as compared with normal weight individuals . Regarding to the level of serum leptin hormone was a highly significant raise in obese individuals while in over-weight individuals we found a slightly decreased as compared with normal weight individuals . Our laboratory data revealed a significant elevation of the level insulin resistance in obese group, but in case of over-weight group a slightly decreased was obtained.

Conclusion: Evaluation of the levels of serum ghrelin, leptin and insulin resistance are good markers of the amount of body fat in obese and over-weight individuals .

Key words : Ghrelin, Leptin, Insulin resistance, Obesity.

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LIST OF ABBREVIATIONS

BMI	: Body Mass Index
CNS	: central nervous system
PVN	: paraventricular nucleus
SNS	: sympathetic nervous system
FFAs	: free fatty acids
NIDDM	: Non-Insulin Dependent Diabetes Mellitus
TG	: triglycerides
WHO	:World Health Organization
GD	: gallstone disease
VMH	: ventromedial hypothalamus
PVN	: Paraventricular nucleus
MC4-R	: melanocortin 4 receptor
SNS	:Sympathetic nervous system
GH	: growth hormone
GHS-R	: growth hormone secretagogue-receptor
GHRL	: Ghrelin hormone
PRL	:Prolactine hormone
ACTH	:Adreno corticotropic hormone
PVN	: paraventricular nuclei
GTT	:Glucose tolerance tests
HIV	: human immunodeficiency virus
ELISA	: enzymelinked immunosorbent assay
G-CSF	: granulocyte colony-stimulating factor
LIF	: leukocyte inhibitory factor
IL-6	: interleukin-6
hGH	: human growth hormone
LEPR	: human leptin receptor
OB-R	: OB receptor

NPY	: Neuropeptide Y
ob	: obesity gene
icv	: intra-cerebro-ventricularly
FFA	: free fatty acid
HDL-C	: HDL-cholesterol
LDL-C	: LDL-cholesterol
HDL	: High-density lipoprotein
LDL	: Low- density lipoprotein
VLDL	: very low density lipoprotein
POMC	:Proopiomelanocortin
IDL	: intermediate density lipoproteins
CVD	: cardiovascular disease
SA-HRP	: streptavidin-horseradish peroxidase
TMB	: tetramethylbenzidine
HCL	: hydrogen chloride
APS	: Acetate plate sealer
IR	: Insulin resistance
HOMA-IR	: homeostasis model assessment
MAbs	: monoclonal antibodies
E2	: estradiol

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I.1. Definition of Obesity

Obesity is often defined simply as a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired (WHO, Obesity, 2000). Obesity is defined medically as a state of increased body weight, more specifically adipose tissue, of sufficient magnitude to produce adverse health consequences (Spiegelman and Flier, 2001). However, obese individuals differ not only according to the degree of excess fat, which they store, but also in the regional distribution of the fat within the body. Indeed, excess abdominal fat is as great a risk factor for disease as is excess body fat per se WHO (World Health Organization, 1998). Human obesity is associated with many significant comorbidities, including cardiovascular disease, diabetes mellitus, hypertension, stroke, osteoarthritis, and some cancers, gallstone disease (GD), etc. (Mantzoros, 1999).

I.2. Classification of Overweight and Obesity

One of the most commonly used indices of relative weight is the Body Mass Index (BMI), which is defined as body weight in kilogram divided by height, in meters squared. It was not originally intended as an index of obesity but is now commonly employed as such in epidemiological studies, to predict obesity-related morbidity and mortality in adults. A BMI of 30 kg/m² is considered the threshold of obesity. BMI however does not distinguish between weight associated with muscle and weight associated with fat.

BMI can be considered to provide the most useful, albeit crude, population-level measure of obesity. The classification of overweight and obesity in adults as proposed by WHO (World Health Organization, 1998) (Table1).

(Table 1): Classification of weight status in adults according to Body Mass Index (BMI) (WHO, 1998)

Classification	BMI (kg/m ²)	Risk of co-morbidities
Underweight	< 18.5	Low (but risk of other clinical problems increased)
Normal range	18.5 – 24.9	Average
Overweight:	≥ 25	Increased
Pre-obese	25 – 29.9	Moderate
Obese class I	30.0 – 34.9	Severe
Obese class II	35.0 – 39.9	Very severe
Obese class III	≥ 40.0	