

SERUM ADIPONECTIN LEVELS IN PATIENTS WITH GESTATIONAL DIABETES MELLITUS

Thesis

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List of Abbreviations

BMI		Body mass index
FFAs		Free fatty acids
GDM		Gestational diabetes mellitus
HCG	.....	Human choriogonadotrophin
HMW	.....	High molecular weight
HOMA	.....	Homeostasis of model assessment
IDDM	.....	Insulin dependent diabetes mellitus
IR	.....	Insulin resistance
IRS	.....	Insulin receptor substrate
LADA	.....	Latent autoimmune diabetes of adults
LMW	.....	Low molecular weight
MMW	.....	Medium molecular weight
MODY	.....	Maturity onset diabetes of the young
NIDDM	...	Non insulin dependent diabetes mellitus
TNFα	.....	Tumor necrosis factor alpha
WAT	.....	White adipose tissues

List of Figures

<i>Figure No.</i>	<i>Page</i>
Figure (1): Comparison between the two studied groups according to parity & abortion ...	87
Figure (2): Comparison between the two studied groups according to parity & abortion ...	87
Figure (3): Comparison between the two studied groups according to age of the patients	89
Figure (4): Comparison between the two studied groups according to gestational age, weight, height and BMI	91
Figure (5): Comparison between the two studied groups according to SGOT, SGPT	93
Figure (6): Comparison between the two studied groups according to serum creatinine	93
Figure (7): Comparison between the two studied groups according to adiponectin level	95

List of Tables

<i>Figure No.</i>	<i>Page</i>
Table (1): Comparison between the two studied groups according to parity & abortion	86
Table (2): Comparison between the two studied groups according to age of the patients ...	88
Table (3): Comparison between the two studied groups according to gestational age, weight, height and BMI	90
Table (4): Comparison between the two studied groups according to glucose, Hb and WBCs	92
Table (5): Comparison between the two studied groups according to SGOT, SGPT and creatinine	92
Table (6): Comparison between the two studied groups according to adiponectin level	94
Table (7): Correlation between the studied parameters in the study group	96
Table (8): Correlation between adiponectin and the studied parameters in the control group.....	97

Contents

Page

Introduction	1
Aim of the Work	4
Review of Literature	5
Patients and Methods	68
Results	85
Discussion	98
Summary and Conclusion	105
Recommendation	107
References	108
Arabic Summary	_____

Introduction

Gestational diabetes mellitus (GDM) is one of the most common pregnancy – related diseases that carries considerable health risk for both the fetus and mother (**Metzger et al., 1998**).

Gestational diabetes mellitus poses a risk to mother and child. This risk is largely related to high blood glucose levels and its consequences. The risk increases with higher blood glucose levels (**Maghbooli et al., 2008**). Treatment results in better control of these levels and reduce some of risks of GDM considerably (**Langer et al., 1994**).

The two main risks GDM imposes on the baby are growth abnormalities and chemical imbalances after birth which may require admission to a neonatal ICU. Infants born to mothers with GDM are at risk of being macrosomic (**Maghbooli et al., 2008**). Macrosomia in turn increases the risk of instrumental deliveries (e.g. forceps, ventouse and caesarean section) or problems during vaginal deliveries such as shoulder dystocia. Macrosomia may affect 12% of normal women compared to 20% of patients with GDM (**Kelly et al., 2005**).

Introduction

However the evidence for each of these complications is not equally strong; in the hyperglycemia and adverse pregnancy outcome, there was an increased risk for babies to be large but not small for gestational age (**Maghbooli et al., 2008**).

Research into complications for GDM is difficult because of the many confounding factors (such as obesity) (**Naylor et al., 1997**). Neonates are also at an increased risk of hypoglycemia, jaundice, polycythemia, hypocalcemia and hypomagnesemia (**Jones, 2001**). GDM also interferes with maturation causing dysmature babies prone to respiratory distress syndrome due to incomplete lung maturation and impaired surfactant synthesis (**Jones, 2001**).

The progressive increase of insulin resistance during pregnancy has main role in the pathogenesis of GDM. Insulin resistance in pregnancy is associated with increased diabetogenic hormones in mothers (**Homko et al., 1999**). Because of sharing a number of physiologic and genetic characteristics of gestational diabetes with type 2 diabetes, it seems to be a major risk factor for development of type 2 diabetes (**Linne et al., 2002**).

Introduction

Adiponectin, a polypeptide hormone derived from adipose tissue, exhibits insulin sensitizing and anti-inflammatory properties (**Diez and Iglesias, 2003**).

The serum adiponectin levels have a negative correlation with body mass index (BMI) (**Havel, 2004**). The serum adiponectin levels are reduced in patients with type 2 diabetes (**Arita et al., 2000**). Therefore, alteration in serum adiporectin levels in GDM may be similar to type 2 diabetes.

Aim of the Work

The aim of this work is to compare serum adiponectin levels in women with gestational diabetes mellitus and healthy pregnant women.

Diabetes Mellitus

Diabetes mellitus, often simply referred to as **diabetes**—is a group of metabolic diseases in which a person has high blood sugar, either because the body does not produce enough insulin, or because cells do not respond to the insulin that is produced. This high blood sugar produces the classical symptoms of polyuria (frequent urination), polydipsia (increased thirst) and polyphagia (increased hunger).

There are three main types of diabetes:

- **Type 1 diabetes:** results from the body's failure to produce insulin, and presently requires the person to inject insulin (Also referred to as *insulin-dependent* diabetes mellitus, *IDDM* for short, and *juvenile* diabetes).
- **Type 2 diabetes:** results from insulin resistance, a condition in which cells fail to use insulin properly, sometimes combined with an absolute insulin deficiency.
- **Gestational diabetes:** is when pregnant women, who have never had diabetes before, have a high blood glucose level during pregnancy. It may

precede development of type 2 DM (**Lawerence et al., 2008**).

Other forms of diabetes mellitus include congenital diabetes, which is due to genetic defects of insulin secretion, cystic fibrosis-related diabetes, steroid diabetes induced by high doses of glucocorticoids, and several forms of monogenic diabetes.

All forms of diabetes have been treatable since insulin became available in 1921, and type 2 diabetes may be controlled with medications. Both type 1 and 2 are chronic conditions that usually cannot be cured. Pancreas transplants have been tried with limited success in type 1 DM; gastric bypass surgery has been successful in many with morbid obesity and type 2 DM. Gestational diabetes usually resolves after delivery. Diabetes without proper treatments can cause many complications. Acute complications include hypoglycemia, diabetic ketoacidosis, or nonketotic hyperosmolar coma. Serious long-term complications include cardiovascular disease, chronic renal failure, retinal damage. Adequate treatment of diabetes is thus important, as well as blood pressure control and lifestyle factors such as smoking cessation and maintaining a healthy body weight.

As of 2000 at least 171 million people worldwide suffer from diabetes, or 2.8% of the population (**Wild et al., 2004**). Type 2 diabetes is by far the most common, affecting 90 to 95% of the U.S. diabetes population (**Wild et al., 2004**).

Definition

The term *diabetes*, without qualification, usually refers to diabetes mellitus, which roughly translates to excessive sweet urine (known as "glycosuria"). Several rare conditions are also named diabetes. The most common of these is diabetes insipidus in which large amounts of urine are produced (polyuria), which is not sweet (insipidus meaning "without taste" in Latin).

The term "type 1 diabetes" has replaced several former terms, including childhood-onset diabetes, juvenile diabetes, and insulin-dependent diabetes mellitus (IDDM). Likewise, the term "type 2 diabetes" has replaced several former terms, including adult-onset diabetes, obesity-related diabetes, and non-insulin-dependent diabetes mellitus (NIDDM). Beyond these two types, there is no agreed-upon standard nomenclature. Various sources have defined "type 3 diabetes" as: gestational diabetes, insulin-resistant type 1 diabetes (or "double diabetes"), type 2 diabetes

which has progressed to require injected insulin, and latent autoimmune diabetes of adults (LADA) (**American Diabetes Association, 2005**).

Classification

Most cases of diabetes mellitus fall into three broad categories: type 1, type 2, and gestational diabetes. A few other types are described (**Santaguida et al., 2008**).

Type 1 diabetes

Type 1 diabetes mellitus is characterized by loss of the insulin-producing beta cells of the islets of Langerhans in the pancreas leading to insulin deficiency. This type of diabetes can be further classified as immune-mediated or idiopathic. The majority of type 1 diabetes is of the immune-mediated nature, where beta cell loss is a T-cell mediated autoimmune attack (**Rother, 2007**). There is no known preventive measure against type 1 diabetes, which causes approximately 10% of diabetes mellitus cases in North America and Europe. Most affected people are otherwise healthy and of a healthy weight when onset occurs. Sensitivity and responsiveness to insulin are usually normal, especially in the early stages. Type 1 diabetes can affect children or adults but was