

# **OMENTIN-<sup>1</sup> IN CHILDHOOD DIABETES**

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# اومنتين ١ في مرض البول السكري عند الأطفال

رسالة

توطئة للحصول على درجة الماجستير  
في طب الأطفال

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَأَنْزَلَ اللَّهُ عَلَيْكَ  
الْكِتَابَ وَالْحِكْمَةَ  
وَعَلَّمَكَ مَا لَمْ تَكُنْ  
تَعْلَمُ وَكَانَ فَضْلُ  
اللَّهِ عَلَيْكَ عَظِيمًا

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# LIST OF ABBREVIATIONS

<b>Abbrev.</b>	<b>Full term</b>
<b>ACE</b>	Angiotensin converting enzyme
<b>APCs</b>	Antigen presenting cell
<b>BMI</b>	Body mass index
<b>CSII</b>	Continuous subcutaneous insulin infusion
<b>DCCT</b>	Diabetes control and complication trial
<b>DKA</b>	Diabetic ketoacidosis
<b>DM</b>	Diabetes mellitus
<b>DpT-1</b>	The diabetes prevention trial 1
<b>GAD65</b>	Glutamic acid decarboxylase autoantibodies (65 K isoform)
<b>GFR</b>	Glomerular filtration rate
<b>HbA1c</b>	Glycated hemoglobin
<b>hEs</b>	Human embryonic stem
<b>HHS</b>	Hyperglycemic hyperosmolar state
<b>HOMA</b>	The hemostatic model assessment
<b>HWF</b>	Hepatocyte nuclear factor
<b>IA2</b>	ICA 612 or tyrosine phosphatase autoantibodies
<b>IAA</b>	In autoantibodies
<b>ICA</b>	Islet cell autoantibodies
<b>IDDM</b>	Insulin dependent diabetes mellitus
<b>IL</b>	Interleukin
<b>IR</b>	Insulin resistance
<b>LDL</b>	Low density lipoprotein
<b>MODY</b>	Maturity onset diabetes of the young

## **LIST OF ABBREVIATIONS (Cont...)**

<b>Abbrev.</b>	<b>Full term</b>
<b>NGSP</b>	National Glycohemoglobin Standardization program
<b>NKT</b>	Natural killer T cells
<b>NNTR</b>	Variable number of tandem repeats
<b>OGTT</b>	Oral glucose tolerance test
<b>PCOS</b>	Polycystic ovary syndrome
<b>PDR</b>	Proliferative diabetic retinopathy
<b>T1DM</b>	Type I diabetes mellitus

## INTRODUCTION

Diabetes mellitus is a heterogeneous group of metabolic diseases characterized by hyper-glycemia resulting from defects in insulin secretion, insulin action, or both. The current classification of diabetes mellitus includes; type 1 diabetes, type 2 diabetes and gestational diabetes (*Bailey-Bucktrout et al., 2009*).

T1DM diabetes is considered as an autoimmune disease which is developed due to T-cell-mediated destruction of  $\beta$  cells in the islets of Langerhans of the pancreas. In children with active  $\beta$ -cell destruction auto antibodies against  $\beta$ -cell structures appear in the circulation. In T1DM the cause for  $\beta$ -cell destruction is not known. T1DM is the most common form of diabetes in children worldwide, and approximately 10% of the children with diabetes have T1DM. In addition, there are several rare forms of diabetes diagnosed in the early childhood or in late youth (*Harjutsalo et al., 2008*).

Type 2 diabetes mellitus is a heterogeneous syndrome characterized by insulin resistance and/or defective insulin secretion (*Gerich, 1998*). The mechanisms underlying insulin resistance are not yet fully clarified. The body mass index (BMI) and serum triglycerides are the most important factors responsible for the evolution of insulin resistance in type 2 diabetic patients (*Taniguchi et al., 2000*).

Adipose tissue is now recognized as an endocrine organ that secretes peptides known as adipokines. Adipokines may

function as modulators of metabolism, such as leptin, adiponectin, resistin, apelin and omentin, or as modulators of inflammation, such as TNF $\alpha$ , interleukin- $\gamma$ , adipsin, acetylation-stimulating protein, plasminogen-activator inhibitor type (*Eldor et al.*, 2007).

Omentin is a novel adipokine codified by two genes that are selectively expressed in visceral adipose tissue and highly abundant in plasma (*Schaffler et al.*, 2009). The concentration of omentin $\gamma$ , the major circulating isoform in human plasma, was determined to be 100 ng to 1 mg/ml (*Yang et al.*, 2007).

The levels of circulating omentin- $\gamma$  are decreased in obesity, and they correlate with several markers of the metabolic syndrome, positively with adiponectin and high-density lipoprotein (HDL) levels and negatively with body mass index (BMI), waist circumference, insulin resistance and leptin level (*de Souza et al.* 2007).

Omentin levels decrease with obesity and insulin resistance and increase as high-density lipoprotein and adiponectin increase (*de Souza et al.*, 2007).

## **AIM OF THE WORK**

To assess plasma omentin level in obese children and adolescents with type 1 diabetes mellitus and type 2 diabetes mellitus as well as non-obese children and adolescents with type 1 diabetes mellitus and type 2 diabetes mellitus in relation to matched age and sex healthy control subjects.

## **DIABETES MELLITUS**

### **Definition:**

**D**iabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.

The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction and failure of different organs especially the eyes, kidneys, nerves, heart and blood vessels (*American Diabetes Association, 2010*).

Several pathogenic processes are involved in the development of diabetes. These range from autoimmune destruction of the  $\beta$  cells of the pancreas with consequent insulin deficiency to abnormalities that result in resistance to insulin action. The basis of the abnormalities in carbohydrate, fat, and protein metabolism in diabetes is deficient action of insulin on target tissues. Deficient insulin action results from inadequate insulin secretion and/or diminished tissue responses to insulin at one or more points in the complex pathways of hormone action (*American Diabetes Association, 2010*).

Impairment of insulin secretion and defects in insulin action frequently coexist in the same patient, and it is often unclear which abnormality, if either alone, is the primary cause of the hyperglycemia (*American Diabetes Association, 2010*).