Study of Role of Visfatin on Blood Glucose Level in Gestational Diabetes

Thesis

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LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (Cont.)

LIST OF ABBREVIATIONS

Abbrev.	
AC	Abdominal circumference
ADA	American Diabetes Association
AGA	Appropriate- for gestational-age
BPD	Biparietal diameter
BM	Basal membrane
BMI	Body mass index
BW	Birth weight
DCCT	Diabetes Complication Clinical Trials
DKA	Diabetic ketoacidosis
DM	Diabetes mellitus
DME	Diabetic macular edema
DR	Diabetic retinopathy
EFW	Estimated fetal weight
FL	Femur length
FPG	Fasting plasma glucose
G	Grams
GA	Gestational age
GDM	Gestational diabetes mellitus
GH	Growth hormone
GLUT	Glucose transport
GTT	Glucose tolerance testing
HbA1C	Glycosated hemoglobin
HC	Head circumference

LIST OF ABBREVIATIONS (Cont.)

Abbrev.	
hCG	Human chorionic gonadotropin
HCS	Human chorionic somatomammotropin
HPL	Human placental lactogen
IDDM	Insulin-dependent diabetes mellitus
IDM	Infant of the diabetic mother
IFG	Impaired fasting glucose
IGF-II	Insulin-like growth factor-II
IGT	Impaired glucose tolerance
IQ	Intelligence quotient
IUGR	Intrauterine growth restriction
Kg	Kilograms
LGA	Large for gestational age
LMP	Last menstrual period
LPL	Lipoprotein lipase
Mmol	Milliequivalent
MODY	Maturity-onset diabetes of the young
MVM	Microvillous membrane
NDDG	National Diabetes Data Group
NPDR	Non proliferative diabetic retinopathy
NTDs	Neural tube defects
OGTT	Oral glucose tolerance test
OR	Odds ratio
P	Probability value
PDR	Proliferative diabetic retinopathy

LIST OF ABBREVIATIONS (Cont.)

Abbrev.	
PGH	Placental growth hormone
PPG	Postprandial glucose
r	Correlation coefficient
r^2	Coefficient of determination
RDS	Respiratory distress syndrome
SGA	Small-for-gestational-age infant
2hPG	2-hour plasma glucose

Introduction

Gestational diabetes mellitus (GDM) which is defined as glucose intolerance with onset or first recognition during pregnancy is a state of temporary insulin resistance ***(Metzger et al., 1991)***. Women with GDM have an increased risk for the development of type II diabetes mellitus ***(Henry et al., 1991)***; insulin resistance is linked to obesity, cardiovascular disease and secretion of adipocytokines ***(Friedman et al., 2005).***

Visfatin a52KDa cytokine, also known as PBEF (pre-B-cell colony-enhancing factor), is highly expressed in visceral fat ***(Fukuhara et al., 2005)*** it is further found in skeletal muscle, liver, bone marrow and lymphocytes ***(Sethi et al., 2005)*** and exerts insulin-mimicking effects through activation of an insulin receptor although in a manner distinct from that of insulin ***(Fukuhara et al., 2005)***. Acute administration of recombinant visfatin to mice leads to reduction of plasma glucose independent of changes in plasma level of insulin, thus it works synergistically with insulin to lower blood glucose level ***(Matsuda et al., 2005).***

It was suggested that visfatin improves insulin sensitivity in patients with type II diabetes ***(Fukuhara et al., 2005)***. Visfatin affects the insulin signal transduction pathway by inducing tyrosine phosphorylation of the insulin receptor and IRS1 & IRS2 in the liver ***(Fukuhara et al., 2005).***

The role of visfatin in human physiology and patho-physiology remains to be elucidated while according to some authors, plasma concentrations of visfatin are elevated in type II diabetes which are states characterized by insulin resistance (IR) ***(Chen et al., 2007).***

Aim of the Work

The aim of our study is to evaluate the role of visfatin in women with gestational diabetes mellitus between 27and 36 weeks of gestation.

Gestational Diabetes Mellitus

Gestational diabetes mellitus is defined as carbohydrates intolerance of variable severity with onset or first recognition during pregnancy. This definition applies regardless of whether or not insulin is used for treatment (***American Diabetes Association, 2004)***. During pregnancy gestational diabetes requires treatment to normalize maternal plasma glucose level to avoid complications in the infant. After pregnancy 5% to 10% of the women with Gestational diabetes are found to have type 2diabetes while Women who have had Gestational Diabetes have a 20% to 50% chance of developing type 2diabetes in the next 5-10 years ***(American Diabetic Association, 2004).***

Gestational diabetes mellitus, a common metabolic alternation in pregnancy, is important because of the obstetric repercussions of fetal complications as (macrosomia, hypo-glycemia, polycthaemia, hyperbilirubinaemia, pre-eclampsia in the mother and neonatal death) ***(Kvetny et al., 1999)***. Gestational Diabetes mellitus was first described in 1952, when Jackson and coworkers observed an association between the grade of glucose intolerance and prenatal morbidity and mortality. In 1973 O'Sullovan proposed a screening test for early detection for Gestational Diabetes mellitus which is plasma glucose measurement 1 hour after oral administration of

50 gm glucose. The second (1985) and third ***(International Workshop, 1991)*** on gestational diabetes mellitus suggested that this test should be performed between weeks 24 and 28 wks of gestation and if the results is positive the patient should then undergo a glucose tolerance test with 100 gm of oral glucose and the plasma glucose measurements at baseline and 1, 2, and 3 hours post load, this was considered to provide the definitive diagnosis of gestational diabetes mellitus, according to the published work, the screening test has the sensitivity of about 78% and specificity of 83% ***(Rafael et al., 2002).***

Classification:

There are 2 different methods of classifying DM in pregnancy. The first is White's classification and the second is the American Diabetes Association (ADA) classification ***(Gilmartin et al., 2008).***

a) White's Classification (White, 1949):

A: Abnormal glucose tolerance test at any age or of any duration but treated only by diet therapy.

A1: GDM Controlled by diet and exercise.

A2: GDM Requiring insulin.

B: Onset at age 20 years or older and duration of less than 10 years.

C: Onset at age 10 to 19 years or duration of 10 to 19 years.

D: Onset before 10 years of age, duration over 20 years, benign retinopathy or hypertension not preeclampsia.

D1: Onset before age 10 years.

D2: Duration over 20 years.

D3: Calcification of vessels of the leg (macro vascular disease).

D4: Benign retinopathy (microvascular disease).

D5: Hypertension (not preeclampsia).

R: Proliferative retinopathy or vitreous hemorrhage.

F: Renal nephropathy with over 500 mg/d proteinuria.

RF: Criteria for both classes R and F.

G: Many pregnancy failures.

H: Evidence of arteriosclerotic heart disease.

T: Prior renal transplantation.

b) American Diabetes Association Classification:

Type I DM: Immunologic destruction of the pancreas.

Type II DM: Exhaustion or resistance of the pancreatic cells.

Gestational DM: A glucose intolerance that had not previously been present prior to pregnancy ***(American Diabetes Association, 2006).***