Correlation between fetal subcutaneous fat tissue thickness and gestational diabetes mellitus

Thesis

Submitted for the partial fulfillment of
Master Degree
In Obstetrics & Gynecology

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(2013)

بسم الله الرحمن الرحيم

ربى أوزعنى

أن أشكر نعمتك التى أنعمت

على وعلى والدى و أن أعمل

صالحا ترضاه و أدخلني برحمتك

في عبادك الصالحين

صدق الله العظيم

أية رقم 19

سورة النمل

Acknowledgement

First and foremost,
I would modestly like to thank

"ALLAH"

Not only for his great gifts
but also
for honoring me with his blessings,
furthermore for rewarding me for my work,
and granting me the power to do my best efforts
day and night
to accomplish this work
I would like to express my endless gratitude to

Prof. Sherif Mohamed Habib

Professor of obstetrics & gynecology
Faculty of medicine, Ain Shams University

For giving me the honor to work under his supervision and providing me with a lot of encouragement and support
Also my deep thanks to

Dr. Amr Mohamed EL-Helaly

Lecturer of obstetrics & gynecology
Faculty of medicine, Ain Shams University

For his generous assistance, valuable guidance and unfailing efforts during the whole period of the study
Finally I would like to thank Ultrasound special care unit for the fetus, my parents and my wife who gave me a lot ofhelp.

CONTENTS

AC ...…….. Abdominal circumference

ACOG....American College of Obstetricians and Gynecologists

AF ……..…….…… Amniotic fluid

BMI ……...…….. Body mass index

BPD ...…….. Biparietal diameter

BPS ……...…….. Biophysical profile score

BW ……...…….. Birth weigh

CD …..……..……..... Caesarian delivery

CS …….……...……...…… Caesarian section

DM ……...……..... Diabetes mellitus

GDM …….…… Gestational Diabetes mellitus

HC……... Head circumference

GTT …… Glucose tolerance test

IDM…… Infant of diabetic mothers

IUGR…… Intrauterine growth retardation

Ln…… Natural logarithm

Kg …… Kilogram

LGA ……...……. Large for gestational ag

L/S……..Lecithin/sphingomyelin

NDDG……... National Diabetes Data Group

P ……...……..… probability

RDS……Respiratory distress syndrome

ROC…….. Receiver Operating Characteristic

SD ……..……..... Standard deviation

SEFT ……. Sonographic estimated fetal weight

SGA ……..... Small for gestational age

T …….……...… Analysis of variance test (ANOVA)

TS……..…Thoracic spines

U/S ……..…… Ultrasonography

Wt ……..……...…….. Weight

Introduction

Gestational diabetes is the most common complication affecting women during pregnancy, due to possible maternal and fetal complication (**Metzger , Coustan ; 1998**).

This, as well as the associated maternal, perinatal and long-term morbidity, emphasizes the need for an appropriate and accurate screening method. Despite recent developments regarding the management of gestational diabetes, the likelihood of fetal macrosomia and other problems during pregnancy and labour remains significantly high in comparison to the general population. The glucose tolerance test is the most frequently used diagnostic test for gestational diabetes ; however, it is time consuming and less tolerated and is usually performed between 24 and 28 weeks of gestation **(WHO; 1980).**

It is well known that adipose tissue thickness and skin fold thickness are greater in newborns of mothers with gestational diabetes than in the offspring of mothers with normal glucose metabolism (**Greco P, et al..2003**).

Fetal adiposity is known to be a consequence of maternal diabetes (**Lanciprete G, et al 2008**).

Abnormal fetal growth, whether macrosomia or growth restriction, has important implications relating to both short-term perinatal and possibly long-term metabolic outcome **(Catalano, 2001)**.

Studies have reported an increased adult risk of the insulin resistance syndrome **(Barker, 1993)**.

In addition to intrinsic/genetic factors, fetal in utero metabolic environment may also affect the offspring's long-term growth and metabolism (the so-called metabolic imprinting effect).Long-term follow-up studies showed that a diagnosis of diabetes during gestation significantly increases the risk of both adolescent obesity and glucose intolerance, in contrast with that of children of the same woman when her glucose tolerance was normal during gestation **(Pettitt, 1993) (Yogev, 2009)**.

Various factors have been associated with alterations in fetal growth. These include genetic factors such as neonatal sex and ethnic group; geographic factors such as altitude; maternal factors such as pre-gravid height, weight, and weight gain during gestation; and, to a lesser degree, paternal factors such as height and weight **(Catalano, 2001)**.

In the assessment of fetal growth, the estimation of body composition has been a useful paradigm. As first hypothesized by **Sparks**, fetal fat-free mass may represent growth regulated

primarily by intrinsic/genetic factors, whereas fat mass maybe more affected by environmental factors such as the maternal metabolic environment. Maternal diabetes results in alterations of the fetoplacental metabolic environment, which also affect fetal growth **(Sparks, 1984)**.

Excessive fetal growth occurs in as many as 50% of pregnancies, complicated by gestational diabetes mellitus with a frequency of LGA infants has been reported to be between 25% and 45 % **(Celeste, 2004) (Kitzmiller, 1986)**.

Although fetal growth can be measured by birth weight, a more accurate way to characterize overgrowth is by an estimation of body composition, which includes lean body mass and fat mass. Lean body mass is metabolically active tissue and is relatively stable in utero while fat mass is more variable and sensitive to factors that affect fetal growth **(Cetin, 2005) (Miller, 1953)**.

Aim of the Work

To evaluate the efficacy of ultrasound measurement of fetal subcutaneous fat as an alternative method in the diagnosis of gestational diabetes mellitus.

Screening and diagnosis of GDM

While the existence of an abnormality of glucose metabolism in some pregnant women cannot be disputed, a debate exists as to the clinical value and benefit of screening for GDM. Although an association between several maternal-fetal outcomes and the level of maternal hyperglycemia has been reported.**(Sermer M, et al 1995).**

A single approach of testing for GDM cannot be recommended at the present as there is not enough evidence-based data proving the beneficial effect of a large screening program. Each of the following approaches is acceptable:

1-Routine screening of women at 24–28 weeks of gestation may be recommended with the 50 g glucose challenge test (GCT), using a threshold of 7.8 mmol/L (140 mg/dL), except in those women who fulfill the criteria for low risk.

2-The diagnostic test can be the 100 g oral glucose tolerance test (OGTT), as recommended by ACOG, or the 75 g OGTT, according to the American Diabetes Association (ADA) criteria.

If GDM is diagnosed, glucose tolerance should be reassessed with a 75 g OGTT 6–12 weeks postpartum in order to identify women with persistent glucose intolerance.