Evaluation of fetal midthigh fat to lean mass proportion as a predictor of birth weight and fetal outcome in pre-eclampsia and diabetes

Thesis

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CONTENTS

AC ...…….. Abdominal circumference

AF ……..…….…… Amniotic fluid

AFI ……...……. Amniotic fluid index

BMI ……...…….. Body mass index

BPD ...…….. Biparietal diameter

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

BW ……...…….. Birth weight

CRH ……. Corticotrophin releasing hormone

CD …..……..……..... Caesarian delivery

CS …….……...……...…… Caesarian section

DM ……...……... Diabetes mellitus

FH ……...…….. Fundal height

GDM …….…… Gestational Diabetes mellitus

HC……... Head circumference

GTT …… Glucose tolerance test

IQ…… Intelligence quotient

IUGR…… Intrauterine growth retardation

Ln…… Natural logarithm

Kg …… Kilogram

LGA ……...……. Large for gestational age

MCA ……...…… Middle cerebral artery

P ……...……..… probability

SD ……..……..... Standard deviation

SEFT ……. Sonographic estimated fetal weight

SGA ……..... Small for gestational age

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

UA ……...…….……...……. Uterine artery

U/S ……..…… Ultrasonography

Wt ……..……...……. Weight

Introduction

The identification of pregnancies at risk for preventable perinatal morbidity and mortality is a primary goal of the obstetric care provider **(Bernstein, 2005)**.

Abnormalities of fetal growth are leading contributors to the perinatal mortality rate **(Lerman, 2007).**

Under conditions of fetal undergrowth, identified as fetal growth restriction (most commonly defined when estimated fetal weights or birth weights are below some preset percentile "third, fifth or tenth" of standardized population specific norms), the perinatal mortality rate is 6–10 times greater than that for a normally grown population **(Gardosi, 1998)**.

The risk of poor fetal growth is high in special situations including the neonatal complications of respiratory distress syndrome, hypoglycemia, hypocalcaemia, hyperphosphatemia, polycythemia, hyponatremia and hypothermia **(Bernstein, 2000**).

Majority of routine Ultrasonographic parameters (Biparietal diameter, head circumference and femur length) are valuable in the assessment of gestational age due to their resistance to environmental influence which makes them less

well suited for identification of growth abnormalities **(Johnsen, 2004)**.

Employing measures of fetal abdominal wall thickness demonstrated that reduced abdominal wall thickness is linked to fetal growth restriction and increased morbidity **(Gardel, 1999)**.

Other researches have demonstrated that the fat mass compartment is disproportionately reduced in growth-restricted fetuses defined by weight **(Padoan, 2004)**.

Estimates of fetal fat have also been employed in the examination of fetal overgrowth. Using both abdominal wall fat thickness and proximal extremity fat area, several authors have identified increases in fetal fat mass in association with maternal diabetes **(Larciprete, 2003) (Rigano, 2000)**.

Other researches have demonstrated that sonographic estimates of proximal extremity fat area, normalizes when women with gestational diabetes achieve strict glycemic control **(Ferrazzi, 2000)**.

The fetal proximal extremities appear to be the primary anatomic location for the estimation of fetal lean body mass **(Bernstein, 1997)**.

The fetal overgrowth observed with maternal diabetes is associated with identifiable increases in fetal lean body mass, but these increases tend to be proportionately smaller than the increases observed in fat area **(Valensise, 2003)**.

Reductions in lean body area have been observed in fetal growth restriction, although the proportional reduction in fetal fat mass is also generally of greater magnitude, One exception to this is in the fetus of the smoking mother **(Padoan, 2004)**.

Recent researches suggest that decrease in lean area in diabetic and significant increase in total fat area, also in pre-eclamptic mothers there is a disproportionate decrease in fat and lean areas, as the decrease in fat was more pronounced **(Bernstein, 2000)**.

The ponderal index was first described by Rohrer in 1921 as an index of corpulence **(Rohrer, 1922).**

It is an index of neonatal size (weight/length^3) which describes the nutritional state of the neonate. When compared with birth weight percentile, the ponderal index demonstrates an improved ability to predict asphyxia, acidosis, hypoglycemia, and hypothermia in fetal undergrowth.

Attempts to translate the ponderal index directly to the fetus have been faced by the difficulty in accurately assessing fetal length. Nevertheless, attempts to modify the ponderal index for fetal sonographic estimation have been made **(Walther, 1982)**.

Inspite of the significant health consequences for abnormal growth, there is a poor predictive value of fetal weight for these complications. So, there is a high need for search for alternative markers of fetal growth abnormality beyond estimates of fetal weight to try and improve the prediction of perinatal risk.