شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

HANAA ALY

شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

INTRODUCTION

The placenta is a transient organ of pregnancy which functions as a critical interface between the mother and the fetus. Filled with maternal blood spaces, which allows transfer of nutrients and drugs to the fetus, it has respiratory, nutritive and excretory functions ***(Donneily et al., 2014).***

It acquires endocrine functions, and is related to birth timing as well as presaging future diseases of middle age ***(Kaiser, 2014).***

Often implanted at the uterine fundus, the placenta is commonly attached to the anterior wall of the uterus by 16thweek of gestation. At birth the normal placenta, shorn of its membranes and umbilical cord, weighs between 400-600 gm, the variations being accounted for by racial and geographic factors, pathological conditions, maternal habits such as smoking ***(Benirschke, 2014).***

Ultrasound measurement of placental thickness is a relative simple,reproducible and clinical useful way, which had been used for more than two decades ***(Hafner et al., 2003).***

Placental thickness is highly related to fetal development and may be a key in perinatal outcome. According to ***Sadler et al. (2004),*** at term placenta is approximately 3 cm thick and measures 15-25 cm in diameter ***(Sadler, 2003).***

A ‘warning limit’ of placental diameter of 18 cm and placental thickness of 2 cm at 36 weeks predicts low birth weight neonates ***(Habib, 2002).***

Growth retardation is associated with Placental thickness of less than 2.5 cm. while Diabetes Mellitus, fetal hydrops and intrauterine fetal infections is associated with thick placentas ***(Ohagwu et al., 2009)*** and the large placenta may indicate an infection, anemia or Triploid ***(Smith, 2006).***

Thickened placentas, suggest primary maternal cytomegalovirus infection and fetal disease ***(La Torre et al., 2006).***

Increased mortality rate related to fetal anomalies and higher rates of both small for gestational age, and large, for gestational age infants at term also related to thickened placentas ***(Elchalal et al., 2000).***

AIM OF THE WORK

The aim of this study is to assess the accuracy of placental thickness in estimating fetal weight by u/s during pregnancy and neonatal outcome (APGAR score) in healthy pregnant women.

Chapter 1
FETAL WEIGHT ESTIMATION

The average term infant at birth weights about 3000 to 3600 gm. During the second half of pregnancy, the fetal weight increases in a linear manner with time until about the 37th week of gestation and then the rate slows variably ***(Farah et al., 2009)***.

Many percentile curves were constructed in which the birth weight was plotted against maturity. For example, for any given maturity, 90% of the babies weighed an amount equal to or less than the Figure stated on the 90th percentile curve ***(Gardosi, 1996)***.

Since the fetus always grows more rapidly in the weight than does the placenta, a time comes when the support is no longer adequate for unrestrained growth which is at about 37 weeks or later. At that time, the birth weight curve departs from the straight course ***(Bernstein et al., 2000).***

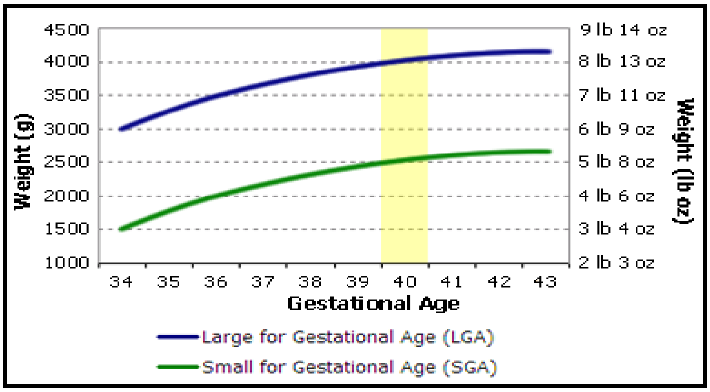

Figure (1): Normal fetal growth and weight ***(Gardosi, 1996).***

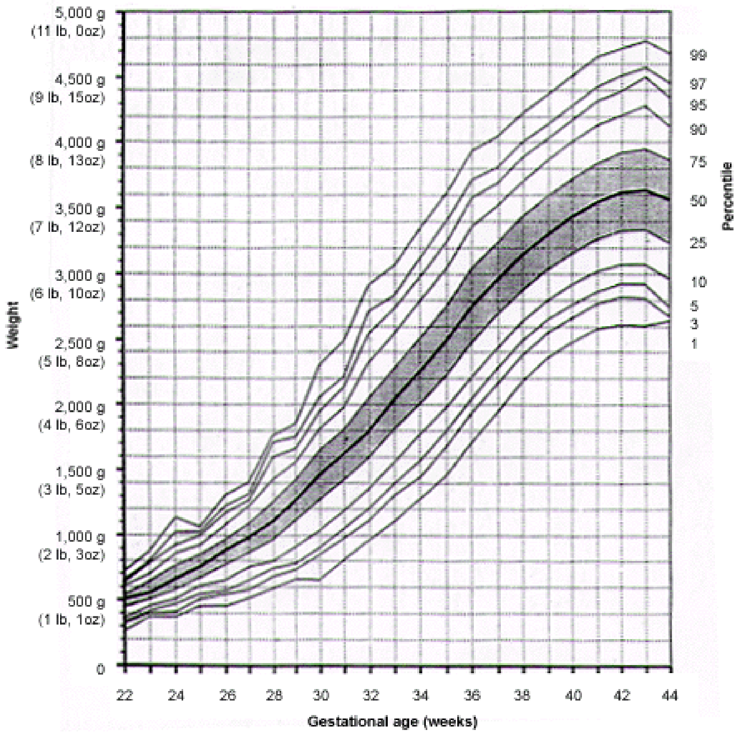

Figure (2): Normal fetal growth curves and percentiles ***(Gruenwald et al., 1967).***

There are several factors that may affect fetal growth and weight. These may include genetics & environmental factors.

Moreover, true racial difference in birth weight has been noted. Mean birth weight can differ by as much as 700g between different races. In a multiethnic study reported that there is significant differences for ultrasound measurement of the fetal head estimated fetal weight between Belgian pregnant woman and Moroccan and Turkish pregnant woman ***(Jacquemyn et al., 2000).***

The maternal nutritional status also plays a role in the fetal growth and weight. The lower mean birth weight observed among the poor is ascribed to their deficient nutritional intake. However the consideration that inadequate diet depresses birth weight is not as simple as many other factors that accompany malnutrition ***(Jacquemyn et al., 2000).***

There is a direct relationship between placenta and fetal weights that becomes evident during the first trimester and less evident onwards; due to the rapid rate of growth of the fetus that exceeds the placental growth rate. The placental weight is not an indication of its function. The association of large placenta with large fetuses may be only a reflection of the somatic growth promoting influences the same for the small placenta associated with small fetus ***(Peter, 2009)***.

The placenta influences fetal growth through its functional size, capacity to transport oxygen and nutrients, and its own metabolism. Placental growth is crucial to fetal growth. This is supported by the fact that, throughout gestation, placental growth closely parallels fetal growth. In addition, it has been demonstrated recently that placental volume measured at 14 weeks was directly related to fetal anthropometric measurements at 35 weeks ***(Sacks, 2004)***.

For diagnosing fetal macrosomia, the two-dimensional (2D) sonographic method has limitations, and most of the published fetal weight (FW) estimation formula underestimate the weight of large fetuses ***(Dudley, 2005).*** The 2D ultrasound formulae are based on measurements of fetal head, body and limbs, alone, or in combination ***(Dudley, 2005).***

On the other hand, it is estimated that 16% of live-born infants have low birth weight, a condition associated with high perinatal morbidity and mortality ***(Thornton, 2001).*** On the other hand, identifying LBW is very important, since sub-optimal birth weight may have consequences in the perinatal period, during infancy, and even in adulthood. In the first place, perinatal morbidity and mortality are more frequent in LBW infants than in normal infants; LBW has become the second cause of death in this period, after premature birth ***(Wang et al., 2011).***

Furthermore, term infants weighing between 1500 and 2500 g at birth have a perinatal mortality rate 5–30 times greater than infants with birth weights between the 10th and 50th percentile, while infants born almost at term weighing less than 1500 g have 70–100 times higher mortality rates. The consequences of LBW on the subsequent development of these infants depend on the specific cause giving rise to the fetal growth restriction, its time of occurrence and the duration of the impairment. It has recently been reported that the intellectual quotient (IQ) of infants with IUGR, at 5 years of age, averages 3.3 points lower than that of normal infants; if they were also premature, the IQ averages 6.7 points lower on intelligence tests ***(De Bernabé et al., 2004).***

Importance of Fetal Weight Estimation

Accurate estimation of fetal weight is of great importance in the management of labour and delivery. During the last decade, estimated fetal weight has been incorporated into the standard routine antepartum evaluation of high risk pregnancies and deliveries such as, diabetic pregnancy, preterm delivery, vaginal birth after a previous caesarean section and intrapartum management of fetuses presenting by the breech ***(Prechapanich et al., 2004).***

High rate of perinatal mortality is still a major cause for concern in some of the developing countries. A large portion of this problem is related to birth weight which remains the single most important parameter that determines neonatal survival and infants who deviate from physiologic norms of weight for gestational age have increased perinatal morbidity and mortality ***(Melamed et al., 2009).***

For example, management of preterm delivery depends wholly or in part on the estimation of expected birth weight which helps in perinatal counseling on likelihood of survival, the intervention undertaken to postpone the delivery, optimal route of delivery, or the level of hospital where delivery should occur ***(Akinola et al., 2007)***.

It is estimated that 16% of live-born infants have low birth weight, a condition associated with high perinatal morbidity and mortality. At the current time, there is a great controversy over how the Obstetrics management should be when the delivery of a low birth weight infant is imminent ***(Iffy et al., 2008).***

Currently, neonatal intensive care units report improvement in neonatal survival rates and long term prognosis for infants weighting between 750 and 1500gm, a fact which is forcing obstetricians to make management decisions based on expected fetal neonatal weight and a major problem in the decision making process seems to be the inability to estimate fetal weight accurately prior to delivery ***(Heiskanen et al., 2006).***

Moreover, many epidemiological studies supported the hypothesis that those born with low birth weight are at an elevated risk of developing type 2 diabetes, obesity, coronary heart diseases and hypertension during adulthood ***(Yan Tian et al., 2006)***.

On the other hand, nearly, 10% of all newborns weight 4000gm or more. Birth weights beyond 4000gm are known to be associated with complicated deliveries especially shoulder dystocia and brachial plexus injury, that bear the most significant long term consequences ***(Gilber et al., 1999)***.

Shoulder dystocia occurs in 0.2% of all deliveries but its incidence rises to 5% in birth weight of 4000-4500gm and up to 30% in babies larger than 4500gm. Moreover, 50% of the cases of shoulder dystocia occur in babies weighting <4000gm. In 10% of reported cases of shoulder dystocia, brachial plexus injury is found but about 90% of those are temporary ***(Weiner et al., 2002)***.

Methods of Estimating Birth Weight

The main methods for predicting birth weight in current obstetrics are clinical techniques based on abdominal palpation of fetal parts, calculations based on fundal height and sonographic measures of skeletal fetal parts which are then inserted into regression equations to derive estimated fetal weight ***(Hendrix et al., 2000).***

The available techniques can be broadly classified as:

(a) **Clinical methods:** tactile assessment of fetal size e.g. Leopold's maneuver, clinical risk factor, maternal self-estimated fetal weight and equations for prediction of birth weight.

(b) **Imaging methods:** ultrasonography and magnetic resonance imaging.

Tactile assessment of fetal size

Dare et al. (1990) used this technique. It is the oldest technique for assessing fetal weight through manual assessment of fetal size by obstetricians worldwide, i.e. by external palpation of the uterus and fetal parts. This method is extensively used because it is both convenient and virtually costless. However, it has long been known as a subjective method that is associated with significant predictive errors. It is both patient and clinician dependent for its success (less accurate for obese gravidas than non-obese and significant inter-observer variation in prediction of birth-weight even among experienced clinicians) ***(Bossak and Spellacy, 1972*)**.

Clinical risk factor

This involves quantitative assessment of clinical risk factors and has been shown to be valuable in predicting fetal weight. In the case of fetal macrosomia, the presence of risk factors, such as maternal diabetes mellitus, abnormal glucose screening test, prolonged pregnancy, maternal obesity, pregnancy weight gain of >20 kg, maternal age of >35 years, maternal height >5 ft. 3 in., multiparity, male fetal sex, and white race, should make the obstetrician suspicious of fetal macrosomia and assess accordingly ***(Harmon et al., 2011).***

Maternal self-estimation

Perhaps surprisingly in developed (literate) society, maternal self-estimation of fetal weight in multiparous women shows comparable accuracy to clinical palpation in some studies for predicting abnormally large fetuses ***(Baum et al., 2002).***

Ultrasonographic Estimation of Fetal Weight

Since its introduction into obstetrics in the late 1950s, ultrasound has played an increasingly important role in the characterization of normal fetal growth and the detection of fetal growth abnormalities. Fetal growth assessment is very important to clinicians as decrease or excess in fetal growth is associated with increased mortality and morbidity during the perinatal period ***(Bernstein et al., 2000)*** and may also be an important antecedent for childhood and adult disease ***(Barker, 1992)***.

Improvements in image quality and scanning capability have progressively permitted visualization of greater anatomical detail, which, in turn, has led to more sophisticated analyses of the growth process ***(Deter et al., 1981)***.

The majority of studies on prediction of macrosomia are based on sonographic measurements employed as either single parameters (such as abdominal circumference or subcutaneous tissue thickness) or combinations of measures to estimate fetal weight. The different sonographic methods do not seem to differ substantially in terms of power to predict macrosomia ***(O'Reilly-Green et al., 2000)***.

There is some evidence that serial sonographic measurements may improve the predictive accuracy of fetal macrosomia ***(O'Reilly-Greenet al., 2000)***.

Several formulae based on ultrasound measurements of fetal biometry have been developed for fetal weight estimation. In the attempt to improve the accuracy of fetal weight prediction, various fetal anatomical measurements have been used either alone or in combination. Formulae based exclusively on the abdominal circumference (AC) are thought to predict the fetal