



Effects of Ultrasonographic Measures Of Placental Maturity Grading And Thickness On Estimated Fetal Weight

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Abstract

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Background: Placental grading and thickness measures still underutilized in routine clinical practice in spite of their effects on fetal growth and their potential prognostic values .

This study aimed to establish the effects of placental maturity grading and thickness on the estimated fetal weight at term pregnancy.

Patients and method: A prospective , cross-sectional study on (150) pregnant , who attended the radiology outpatient clinic for routine obstetric ultrasound in, Thi-Qar Province, Iraq.

The average gestational age and the fetal weight are calculated using Hadlock formula .The placental maturity graded in to four grades according to homogeneity, calcification and chorionic plate undulation and the thickness is measured at the site of the umbilical cord insertion in millimeters .

Results: The mean placental thickness was 35.31 mm. Most placentas were grade 2 maturity (66%). there was a statistically significant association between placental maturity grade and fetal weight (p -value < 0.04), with Grade 2 showing higher fetal weights. while at 40 weeks, the association was not significant (p-value = 0.624) .There was a significant positive correlation between placental thickness and fetal weight at 37, 38, and 39 weeks (p-value = 0.001). The strongest correlation was observed at 39 weeks.

Conclusion: This study concludes that measurement of placental thickness and grading of placental maturity during routine antenatal obstetric ultrasound assessment can help to predict the estimated fetal weight and can be used as complementary measures besides other parameters to determine fetal well-being and outcome.

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1. Introduction

The placenta plays pivotal role in the fetal well-being .It acts as lifeline that supports fetal development .(1).The placenta is a unique organ that biologically and physically connects the embryo to the uterine wall .The placenta provides the fetus with water, nutrients, and oxygen throughout the pregnancy .It also removes metabolic waste products and carbon dioxide ,excreted by the fetus (2).

Two dimensional ultrasound is the primary and often the only tool used to assess the placental thickness during pregnancy (3). Ultrasound evaluation during pregnancy includes its morphology , anatomical location , implantation, size , color and pulsed Doppler assessment .(2)

Assessment of placenta is a part of the routine obstetrical ultrasound , but usually the assessment limited to determine placental location , its relation to the internal os , and abnormal implantation , but the overall examination of the placenta is limited (1.3) .

Placental grading was introduced by Grannum et al as the method for assessment of the ling maturity of the fetus (4).

Based on adjustment looks of the chorionic plates , placental substantiation and basal overlay , the placenta can be classified to four grades from 0 to grade III .(5)

Grade 0 characterized by smooth chorionic plate with homogenous uniform texture .Grade I shows mild undulation of chorionic plate with small scatted echogenic areas within the placental substance .Grade II shows linear calcification within basal plates .Grade III marked calcification distributed through out the placental contour with marked undulation of chorionic plate.(1,4,5)

The placental surface maturity is completed at third trimester , and the placental thickness growth continues until the late third trimester ,these changes occur in the placenta in the mid half of the second trimester between 17-20 weeks and found to correlate with fetal development ,therefore , serial evaluation of the placental thickness in the second and third trimesters can help to detect the normal development and function and regarding as good predictors for fetal growth and fetal birth weight .(6,7)

Historically placental thickness measurement of 4 cm was regarded as abnormal and found to be associated with poor outcomes and placental thickness less than 2.5 cm at term found to be associated with intrauterine growth restriction .(8,9)

AIM OF THE STUDY :

This study aimed to establish the effects of ultrasound evaluation of placental maturity grading and thickness measurements on the estimated fetal weight at term pregnancy

2. Patients and method:

2.1 Study design:

This is prospective , cross sectional study conducted on (150) pregnant lady who attended the radiology out patient clinic for routine obstetric ultrasound at term during the period from September 2025 to February 2026 in Al Nasiriyah City, Thi-Qar Province, Iraq .

2.2 Patients:

Pregnant lady with singleton term pregnancy included in this study gestational age according to last menstrual period (LMP) was calculated

Pregnant with risk factors such as HT , DM , anemia , multiple pregnancy , problem of the placental implantations , placenta previa, fetal congenital anomalies were excluded from this study .

2.3 ultrasound examination :

All pregnant underwent ultrasound examination using GE voluson /S8 Machine with convex array deep probe of frequency 3.5MHZ. , the average ultrasonographic gestational age calculated using (BPD , FL,HC and AC) and the estimated fetal weight is calculated using Hadlock formula from , BPD , FL , AC and HC

The placenta position is divided into anterior , posterior , fundal and lateral

The maturity graded in to four maturity grades from (0,I,II, and III) according to homogeneity , calcification and chorionic plate undulation

The thickness of the placenta is measured at the site of the umbilical cord insertion by measuring the distance form the chorionic plate to the myometrial –placental interface and calculated in millimeters

2.4 Statistical analysis:

The statistical analysis of the data was performed by using statistical Package for Social Science (SPSS) and Microsoft 365 Excel 2024 ,the data were analysed. And the results were presented as frequency and percentage tables and p-Value .p value less than 0.05 is considered as statistically significant .

3. RESULTS:

The study Population had a maternal age range from 18 to 41 years with mean maternal age of 27.75 years, and the mean gestational age was 37.98 weeks. As shown in Table 1

Table 1: the baseline characteristics of the study population (n=150)

Variables	Mean± sd	Range
Maternal age (years)	27.75± 5.58	18-41
Gestational age (weeks)	37.98 ± 0.8	37-40

The Anterior placental location was the most common 49.3% followed by posterior (34.7%), fundal (12%) and lateral (4%).

The mean placental thickness was 35.31 mm. Most placentas were grade 2 maturity (66%). The mean EFW was 3238.3g, as shown in Table 2.

Table 2: the ultrasound findings of participant women (n=150)

Variables	No.	%	
Placental site	Anterior	74	49.3
	Posterior	52	34.7
	Lateral	6	4.0
	Fundal	18	12.0
Placenta thickness (mm)	Mean± sd	35.31± 4.23	
	Range	25.0-46.0	
Placental maturity grading	Grade 0	4	2.7
	Grade I	41	27.3
	Grade II	99	66.0
	Grade III	6	4.0
Estimated fetal weight (g)	Mean± sd	3238.3± 269.7	
	Range	2700-380070	

There was no significant correlation between maternal age and estimated fetal weight ($r = 0.009$, $p = 0.915$). However, placental thickness showed a positive correlation with fetal weight ($r = 0.454$, $p = 0.001$). Gestational age also demonstrated a positive correlation ($r = 0.496$, $p = 0.001$), as shown in Table 3.

Table 3: The correlation between the estimated fetal weight and other variables

Variable	Estimated fetal weight	
	R-value	p-value
Maternal age (years)	0.009	0.915
Placental thickness (mm)	0.454	0.001
Gestational age (weeks)	0.496	0.001

. Regarding the association between the EFW and placental maturity, the mean fetal weight increased from grade 0 to grade II.

Table 4: Association between the estimated fetal weight and the placental maturity grade.

Variable	Mean estimated fetal weight	p-value
placental maturity grade	Grade 0	0.076
	Grade I	
	Grade II	
	Grade III	

At 37, 38, and 39 weeks, there was a statistically significant association between placental maturity grade and fetal weight (p -value < 0.04), with Grade 2 consistently showing higher fetal weights. However, at 40 weeks, the association was not significant (p -value = 0.624), as shown in Table 5

Table 5: Association between the estimated fetal weight and the placental maturity grade according to gestational age

Variable	Mean Estimated fetal weight (g)	p-value
At 37 weeks		
placental maturity grade	Grade 0	0.001
	Grade I	
	Grade II	
	Grade III	
At 38 weeks		
placental maturity grade	Grade I	0.001
	Grade II	
	Grade III	
At 39 weeks		
placental maturity grade	Grade I	0.004
	Grade II	
	Grade III	
At 40 weeks		
placental maturity grade	Grade II	0.624
	Grade III	

There was a significant positive correlation between placental thickness and fetal weight at 37, 38, and 39 weeks (p -value = 0.001). The strongest correlation was observed at 39 weeks. However, at 40 weeks, the correlation was weak and not statistically significant ($r = 0.149$, $p = 0.145$), as shown in Table 6.

Table 6: The correlation between the estimated fetal weight and the placental thickness according to gestational week

Placental thickness (mm)	Estimated fetal weight (g)	
	R-value	p-value
37 weeks	0.469	0.001
38 weeks	0.508	0.001
39 weeks	0.561	0.001
40 weeks	0.149	0.145



Figure 1 : ultrasound images of 37 weeks gestational age , with maturity grade I and placental thickness (33.3 mm) , the EFW was 2800 gm

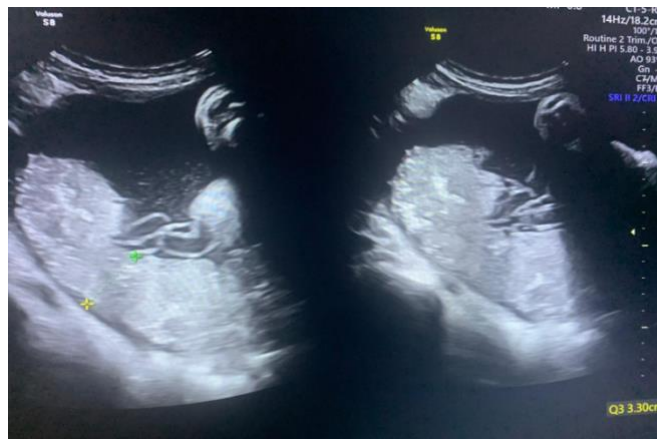


Figure 2 : ultrasound image of 39 weeks gestational age , with maturity grade II and placental thickness (33 mm) , the EFW was 3350 gm

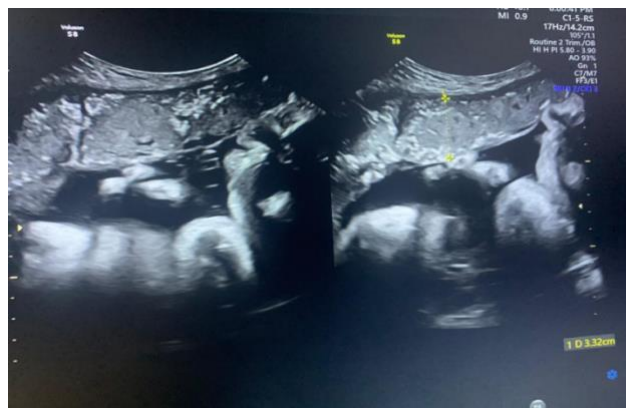


Figure 3 : ultrasound image of 39 weeks gestational age , with maturity grade III and placental thickness (33.2 mm) , the EFW was 3000 gm

4. Discussion

The morphological changes in grading of placenta , texture, and maturity can be assessed with the help of ultrasound. With time, placental maturity increases throughout pregnancy. Placental maturity is a sign of maturity of fetal lungs. The ultrasonographic appearance of placenta is helpful in predicting fetal wellbeing and placental maturity (10,11)

Placental thickness increased as the pregnancy advances in age , so measuring of placental thickness during obstetric ultrasonography help to calculated the gestational age and related to the fetal weight and other biometrics measures .(12,13,14)

In this study which is done during term pregnancy with gestational age range from (37-40 weeks) , the maternal age range from (18-41 years) and the most common age group was 27 years this is in agreement with pihou Gbande et al(2) , the most age group their study that included (256) pregnant was 27 years ranging from (16 to 45) .

The most common site of placenta in the studied group was anterior location seen in 49.3% followed by posterior , fundal and lateral locations in 34.7%,12% and 4% respectively , the same findings were reported by Zena M AlHindawi etal (13) , Farahbod F. etal (15) and Nagesh R , etal (16)

In this study the placental thickness measurement range from 25 to 46 mm with mean placental thickness 35.31 ± 4.23 mm , and the thickness showed appositve correlation with estimated fetal weight and with gestational age r value and p-value measures ($r = 0.454$, $p = 0.001$). and ($r = 0.496$, $p = 0.001$) respectively

Similar finding reported by Banik S et al (12) the placental thickness was 34.67 ± 4.21 , and the thickness matched the gestational age and had positive correlation with gestational age and fetal weight .

Hamidi OP.etal (17) found in their study on 200 pregnant that placental thickness has significant positive relation with birth weight with confidence interval 95 % , and the mean placental thickness was 34.2 ± 9.7 mm

Positive strong correlation between fetal birth weight and placental thickness in the second and third trimester also reported in Zena M. Al Hindawi et at, Kane MA etal and Gouda A etal . (13,18,19)

Significant correlation between placental thickness and fetal weight at 37,38 and 39 weeks with highest relation at 39 weeks , while at 40 weeks no significant association noticed this may due to only 5 pregnant were at 40 weeks involved in our study

Most common placental grade in this study was grade II which found in 66% followed by grade I in 27.3 % , the mean fetal weight increased from grade 0 to grade 2; At 37, 38, and 39 weeks, there was a statistically significant association between placental maturity grade and fetal weight (p -value < 0.04), with Grade 2 consistently showing higher fetal weights. While , at 40 weeks, the association was not significant (p -value = 0.624) this is may be due to increased maturity grade with increase gestational age associated with high grade of calcification which can adversely affect the fetal circulation and weight

Dr Indira Lamba etal (20) found that 50 % of the studied group were grade II and III after 37 weeks of gestation ,and maturity grade II associated with higher fetal weight while grade III with lower birth weight .

In Farahbod F et al(15) , their study showed that homogeneity and grading of placenta affect the pregnancy outcome and fetal well being, where grade III maturation may associated with small for gestational age with low birth weight in comparison with grade II placental maturation .

Conclusion:

This study concludes that measurement of placental thickness and grading of placental maturity during routine antenatal obstetric ultrasound assessment can help to predict the estimated fetal weight and can be used as complementary measures besides other parameters to determine fetal wellbeing and outcome.,

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