

SONOGRAPHIC COMPARISON OF PLACENTAL ECHOGENECITY AND THICKNESS IN NORMAL VERSUS GESTATIONAL DIABETIC PREGNANCIES

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Abstract

Pregnancy is a diabetogenic state and is commonly complicated by gestational diabetes mellitus (GDM), which is a frequent metabolic disorder of pregnancy. It is associated with elevated maternal blood glucose levels and can affect the health of the mother as well as the fetus. This condition may induce structural and functional alterations in the placenta, an organ critical for oxygen and nutrient transfer that directly affects fetal growth. As a non-invasive and safe imaging technique, ultrasound proves valuable for evaluating placental characteristics including echogenicity and thickness, thereby facilitating early identification and surveillance of complications associated with GDM.

Objective: To sonographically compare the placental echogenicity and thickness in normal Versus gestational diabetic pregnancies.

Methodology: This cross-sectional study was conducted in the UOL Ultrasound Clinic Green Town Lahore, over a duration of 7 months. This study is based on a convenient sampling technique and the study population comprised pregnant females from the second trimester till term, including both normal pregnancies and diagnosed cases of gestational diabetes mellitus (GDM). Females with other pregnancy-related complications were excluded from the study.

Results: Out of 100 participants, 50 were GDM and 50 were normal pregnancies. In the GDM group, 23 showed heterogeneous placental echogenicity, 18 had mildly increased echogenicity, and 9 had normal findings, while all normal pregnancies showed normal echogenicity. Mean placental thickness was higher in GDM (44.0) compared to normal pregnancies (30.1), with results being statistically significant ($P < 0.0001$).

Conclusion: Placental thickness and echogenicity were significantly increased in GDM pregnancies ($P < 0.0001$), while placental location, grade, and obesity showed no significant differences. Ultrasound assessment of these placental changes is a useful, non-invasive tool for monitoring GDM.

INTRODUCTION

Gestational diabetes mellitus (GDM) is considered as the most shared difficulty of gravidity, with glucose intolerance of variable degrees detected for the first time during pregnancy. It is associated with adverse pregnancy outcomes and with later life health consequences for both offspring and mothers. In women with GDM, their long-term risk includes cardiovascular disease and type 2 diabetes mellitus, and the children with its increased risk of glucose intolerance and childhood obesity (Moon JH, Jang HC et al., 2022). The prevalence is increasing and mirrors the rise in maternal obesity in recent years (Johns EC et al, 2018). Global GDM prevalence has been rising due to epidemiologic factors then increasing prevalence of obesity in women of reproductive age and increasing maternal age (Sweeting A et al, 2022). GDM occurrence in studies in Pakistan have reported from 4.41% to 57.90% (Adnan et al., 2024). Hyperglycemia complicates approximately 1 in 6 pregnancies globally and the majority of these cases are due to gestational diabetes mellitus (Guariguata et al, 2014).

Although it is discarded after birth, the placenta is an eminently complex and fascinating organ. It acts as the fetal liver, kidney, bowel and lungs during gestation. In addition, the placenta has profound endocrine effects on maternal metabolism and physiology and on a maternal organism that provides a safe environment for fetal development (Burton GJ et al., 2015). As a transient but essential organism, placental is responsible for metabolic waste, elimination of products of metabolism, delivery of nutrients to fetus and oxygen transfer via fetal and maternal blood. As well as acting as a transporter, this organ produces a number of growth factors and hormones that influence fetal development

and the maternal physiological response to pregnancy (Burton & Fowden 2015).

Acting as the interface between fetus and mother, the placenta is essential for fetal development and growth. It also has endocrine and immune system functions that prevent fetal damage and lead to maternal physiological changes in pregnancy. Whilst the placenta, along with the fetus, is usually ignored during routine obstetric ultrasonography and discarded after delivery, detailed sonographic evaluation can detect placental abnormalities that may have major implications for the management of pregnancy and the outcome (Bowman ZS et al., 2014). When compared to normal pregnancies, studies examining the histoarchitecture or macroscopic morphology of placentas from GDM pregnancies frequently find increased placental size, villous immaturity, and numerous vascular abnormalities. However, there aren't many US studies that assess placental development in GDM pregnancies, particularly during the first and second trimesters. Few research have examined the relationship between maternal BMI and placental pathology, but the data that is currently available indicates that BMI may have an impact. Early pregnancy placental maturation in GDM needs further study to define the onset of derangement and thereby a first hit in causation may be revealed (Ehlers E et al., 2021). Placenta lies between fetal and maternal circulations, providing a conduit for materno-fetal gas and nutrient exchange, yet it is susceptible to conditions in the uterus that impair both placental and fetal development. These are the same adverse conditions for pregnancy that are present in gestational diabetes mellitus (GDM) and that have also been associated with changes in placental function and structure. Gauster M et al., 2012



Normal placenta at 10 weeks' gestation. Transverse gray-scale US image shows the chorion laeve (right arrow) and chorion frondosum (left arrows) of the placenta. Fadl, S et al., 2017

Now, people are growing human placentas in the lab. While we rely on ultrasound as the primary imaging tool in obstetric practice, the placenta is often neglected. Healthy placenta is homogeneously echogenic, discoid in shape, and rounded in margin. Placental thickness increases with gestation, focal sonographic hypoechoic areas (placental lakes) increase in numbers and placental maturation (calcification) can be observed. In contrast to Doppler studies, which involve technical difficulties, assessment of placental morphology and thickness measurements are easy and straightforward procedures (Schiffer et al., 2021).

During a normal pregnancy, when the fetus is not apparently compromised, the placenta receives little attention upon its routine evaluation. Placental thickness is, therefore, a good predictor not only of birth weight but also of fetal growth, especially in the second trimester. Studies have proved that sonographically assessed PT correlates well with gestational age and may be a useful additional parameter for assessment of fetal development and growth (Ohagwu et al., 2009).

Sonographic assessment of placental thickness has been proposed as an additional metric for evaluating fetal wellbeing and placental maturation. Deviations from normal placental thickness have been linked to unfavorable pregnancy outcomes, including perinatal complications and fetal growth restriction

(Jauniaux et al., 1994). Thickened placentas demonstrated positive associations with hydrops and congenital anomalies, while reduced placental thickness correlated with low birth weight, prematurity, preterm labor, and fetal growth restriction. Sonographic detection of placental abnormalities should prompt clinicians to consider potential perinatal compromise, warranting thorough evaluation and intensified surveillance (Rawal S et al., 2024).

When GDM placentas are investigated after birth, a number of pathological abnormalities have been reported. It is unclear, therefore, whether these anomalies appear during pregnancy and if they occur before or after the development of glucose intolerance. Placental characteristics can now be seen increasingly earlier in pregnancy because to advancements in imaging technologies. This scoping review aims to provide an overview of the knowledge regarding placental anomalies in delivered GDM placentas and the early stages of gestation at which they occur. (Ehlers E et al., 2021).

Gestational diabetes mellitus (GDM) can alter the function and morphology of the placenta, increasing risks for the fetal and maternal well-being. While advanced imaging techniques can detect these changes, they are expensive and not readily available. On the other hand, 2D ultrasonography is a simple and accessible technique for measurement of the echogenicity and thickness of the placenta.

However, to date, reports on their diagnostic performance in GDM are limited and inconsistent. Three-dimensional ultrasound and other new imaging techniques allow for a more detailed examination of placental growth and structure. Pregnancy complicated with gestational diabetes has been shown to have an increased placental volume suggesting that maternal hyperglycemia may affect placental structure and growth (Pala et al., 2016).

This study aims to address this gap in literature by investigating placental echogenicity and thickness between GDM and non-GDM pregnancies. The identification of significant differences and cutoff values could establish 2D ultrasonography as a low-cost, non-invasive technique for the early detection of IUGR

and placental insufficiency, with particular relevance for application in resource-constrained environments.

OBJECTIVE:

To sonographically compare the placental echogenicity and thickness in normal Versus gestational diabetic pregnancies.

MATERIAL AND METHODS

4.1: Study Design: Cross Sectional Study

4.2: Settings: Data was collected from UOL Ultrasound Clinic, Green Town, Lahore.

4.3: Study Duration: 4 months after the approval of synopsis.

4.4: Sample Size: All the patients who visited our clinical setup during our study duration were included.

4.5: Sampling Technique: Convenient Sampling Technique

4.6: Sample Selection:

Inclusion Criteria:

- Group 1: Females aged 18-40 with 2nd and 3rd trimester singleton normal pregnancy were included.
- Group 2: Females aged 18-40 with 2nd and 3rd trimester singleton diabetic pregnancy were included.

Exclusion Criteria:

- Pregnancy included hypertension
- Any other Fetal Anomaly
- Pregnancies included preexisting diabetes

mellitus

4.7: Equipment: Toshiba Xario with 2-5 MHz probe.

Transabdominal ultrasound assessments utilized a high-resolution system fitted with a 2–5 MHz curvilinear transducer. Patients were positioned on their backs on the examination table during the procedure. The best visualization of the uterus and placenta were obtained with a partially filled bladder that acted as an acoustic window. The quality of the images and the transmission of the ultrasound waves were improved by the use of a coupling gel on the skin surface.

The pregnant uterus was systematically surveyed in both the transverse and longitudinal planes. Identification of the placenta was accomplished and its position was noted as either fundal, anterior, posterior or lateral. After localizing, morphological analysis consisted of scrutiny of echogenicity and thickness of the placenta.

Thickness values, in millimeters, were sampled at the site of umbilical cord insertion. Calipers were placed perpendicular to the uterine wall for the thickness from the basal plate to the chorionic plate. Results excluded subplacental veins and myometrial tissue. Based on grayscale ultrasound, echogenicity assessment was performed by contrasting placental echotexture with surrounding maternal liver parenchyma and results were reported as hyperechoic, isoechoic or hypoechoic.

Three independent thickness measurements were obtained per examination for the purpose of minimizing intra-observer variation and improving accuracy. The arithmetic average of these three readings was calculated and recorded as the placental thickness.

All the examinations were performed by experienced radiologists or sonographers; a standardized protocol was used and machine settings were kept constant. The results were immediately documented in a structured proforma after each scan. Software Data were then entered and analyzed by a statistical program to determine if differences in placental echogenicity and thickness exist between gestational diabetes mellitus

pregnancies and matched controls.

4.10: DATA ANALYSIS PROCEDURE

- Data entry and analysis were conducted with MedCalc, version 20.215.
- The first step was a descriptive examination, which assessed the distribution of each variable.

- The mean and standard deviation were used to describe continuous data, whereas frequencies and percentages were used to convey categorical counts.

Student's t-test was used to evaluate group differences in the specified variable indices; a p value of less than 0.05 was considered statistically significant.

4.11 RESULTS

TABLE NO. 1

Frequency Distribution

	N	Minimum	Maximum	Mean	Median
Age	100	20.000	40.000	29.880	29.000
Gestational Age (weeks)	100	13.000	38.000	29.670	30.000

Table no 1 shows total number of patients 100 with maximum and minimum age of patients age and gestational age are 40, 20 and 38,13 respectively

TABLE NO. 2

Independent T-Test

Sample 1		
Variable	Placental_Thickness_mm_ Placental Thickness (mm)	
Filter	Pregnancy_Status="GDM"	
Sample 2		
Variable	Placental_Thickness_mm_ Placental Thickness (mm)	
Filter	Pregnancy_Status="Normal"	
	Sample 1	Sample 2
Sample size	50	50
Arithmetic mean	44.0800	30.1600
95% CI for the mean	41.5117 to 46.6483	27.8804 to 32.4396
Variance	81.6669	64.3412
Standard deviation	9.0370	8.0213
Standard error of the mean	1.2780	1.1344
F-test for equal variances	P = 0.407	

T-test (assuming equal variances)

Difference	-13.9200
Pooled Standard Deviation	8.5442
Standard Error	1.7088
95% CI of difference	-17.3112 to -10.5288
Test statistic t	-8.146
Degrees of Freedom (DF)	98

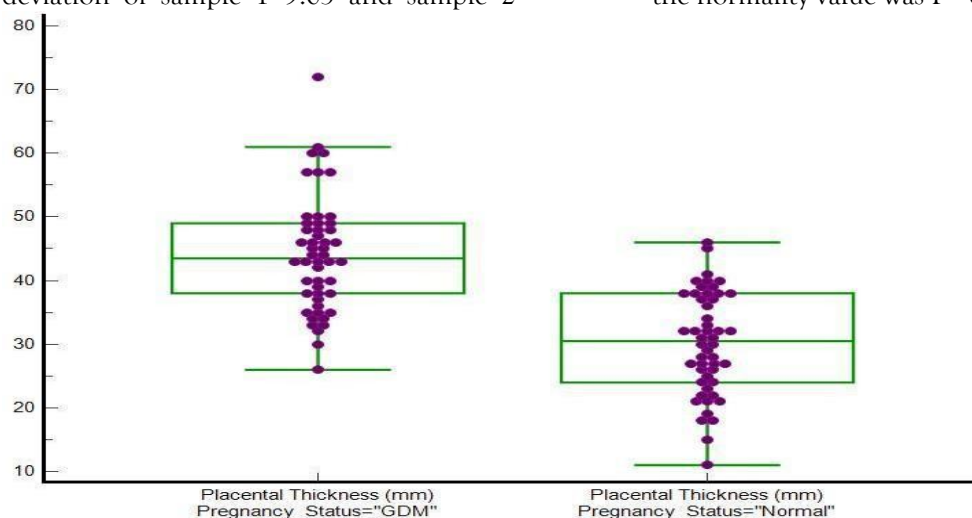
Two-tailed probability	P < 0.0001
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Residuals

D'Agostino-Pearson test for Normal distribution	accept Normality (P=0.3186)
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Table 2 shows the relationship between variable 1 placental thickness ie GDM pregnancies and variable 2 i.e normal pregnancies. Each contains 50 no patients while the arithmetic mean of sample 1 was 44.0 and sample 2 was 30.1. Standard deviation of sample 1=9.03 and sample 2 =

8.02. Standard error of the mean SAMPLE 1=1.2 AND SAMPLE 2 =1.13. P value for equal variance was 0.407. Difference between both samples in t-test was -13.92. Two tailored probability P values are less than 0.0001 which shows the significant results and the normality value was P= 0.31.



The whisker box plot showing the relationship between normal and GDM pregnancies.

TABLE NO. 3

Chi-squared test

Classification X	Treatment Treatment			
Classification Y	Pregnancy_Status Pregnancy Status			
	Treatment			
Pregnancy_Status	Diet Control	Insulin	None	
GDM	28	22	0	50 (50.0%)
Normal	0	0	50	50 (50.0%)
	28 (28.0%)	22 (22.0%)	50 (50.0%)	100

Chi-squared test

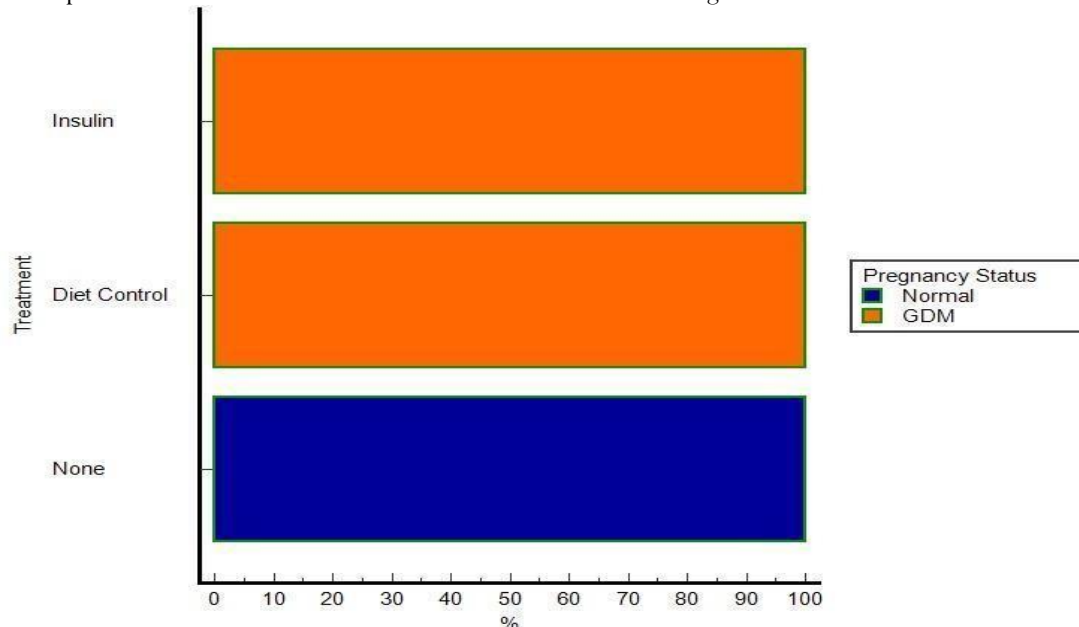
Chi-squared	100.000
DF	2
Significance level	P < 0.0001
Contingency coefficient	0.707

Table 3 shows the relationship between treatment and pregnancy status. The total

sample size was 100 patients, in which 50 (50%) were GDM and 50 (50%) were normal

pregnancies. Among GDM patients, 28 were on diet control and 22 were on insulin treatment, while none of the normal pregnancies required treatment. In contrast, all 50 normal cases had no treatment. The Chi-squared test value was 100.000 with 2

degrees of freedom (DF). The significance level was $P < 0.0001$, which shows a statistically significant association between treatment and pregnancy status. The contingency coefficient was 0.707, indicating a strong association between the variables.



The bar chart shows treatment in normal and gestational diabetic pregnancies.

TABLE NO. 4

Chi-squared test

Classification X	Placental_Location Placental Location				
Classification Y	Pregnancy_Status Pregnancy Status				
Pregnancy_Status	Placental_Location				
	Anterior	Fundal	Lateral	Posterior	
GDM	18	9	6	17	50 (50.0%)
Normal	14	9	11	16	50 (50.0%)
	32 (32.0%)	18 (18.0%)	17 (17.0%)	33 (33.0%)	100

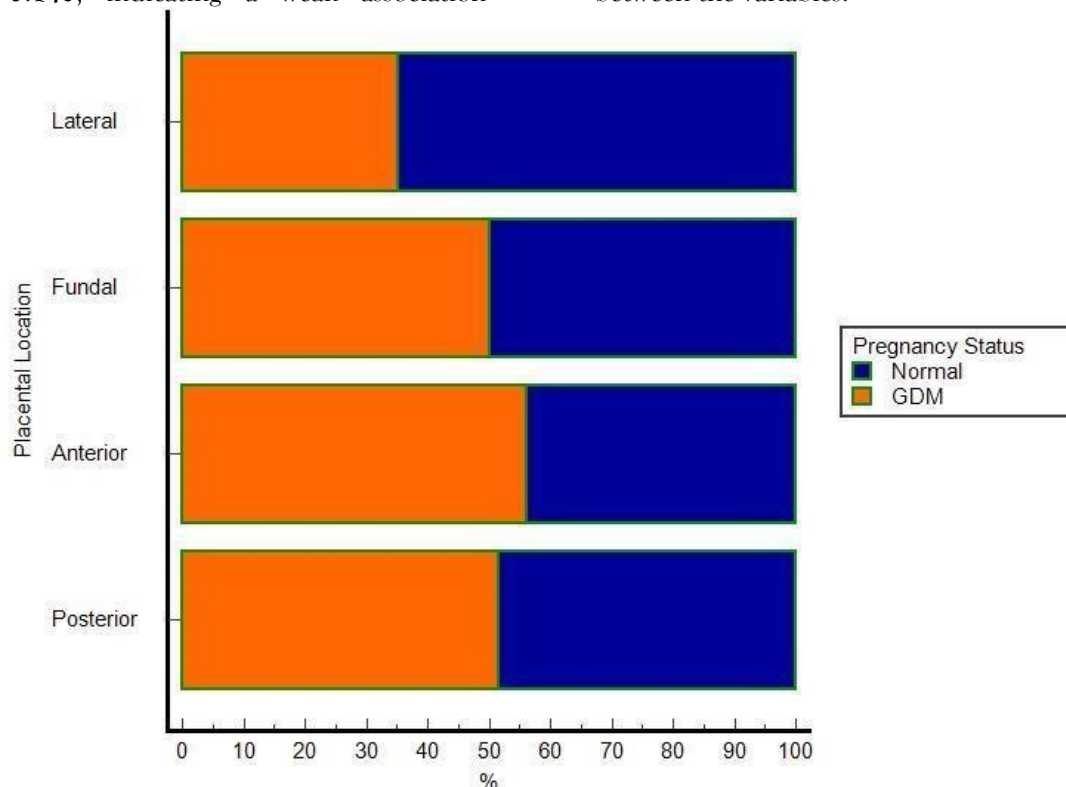
Chi-squared test

Chi-squared	2.001
DF	3
Significance level	$P = 0.5722$
Contingency coefficient	0.140

Table 4 shows the relationship between placental location and pregnancy status. The total sample size was 100 patients, in which 50 (50%) were GDM and 50 (50%) were normal pregnancies. Among GDM patients, 18 had anterior placenta, 9 fundal, 6 lateral, and 17 posterior. In normal pregnancies, 14 had

anterior placenta, 9 fundal, 11 lateral, and 16 posterior. The Chi-squared test value was 2.001 with 3 degrees of freedom (DF). The significance level was $P = 0.5722$, which shows that there is no statistically significant association between placental location and pregnancy status. The contingency coefficient

was 0.140, indicating a weak association between the variables.



The bar chart shows the placental location in normal and GDM pregnancies.

TABLE NO. 5

Chi-squared test

Classification X	Placental_Grade Placental Grade					
Classification Y	Pregnancy_Status Pregnancy Status					
Pregnancy_Status	Placental_Grade					
	Grade 1	Grade 0	Grade I	Grade II	Grade III	
GDM	1	7	12	16	14	50 (50.0%)
Normal	0	5	17	19	9	50 (50.0%)
	1 (1.0%)	12 (12.0%)	29 (29.0%)	35 (35.0%)	23 (23.0%)	100

Chi-squared test

Chi-squared	3.540
DF	4
Significance level	P = 0.4719
Contingency coefficient	0.185

Table no 5 shows the relationship between placental grade and pregnancy status. The total sample size was 100 patients, in which 50 (50%) were GDM and 50 (50%) were normal

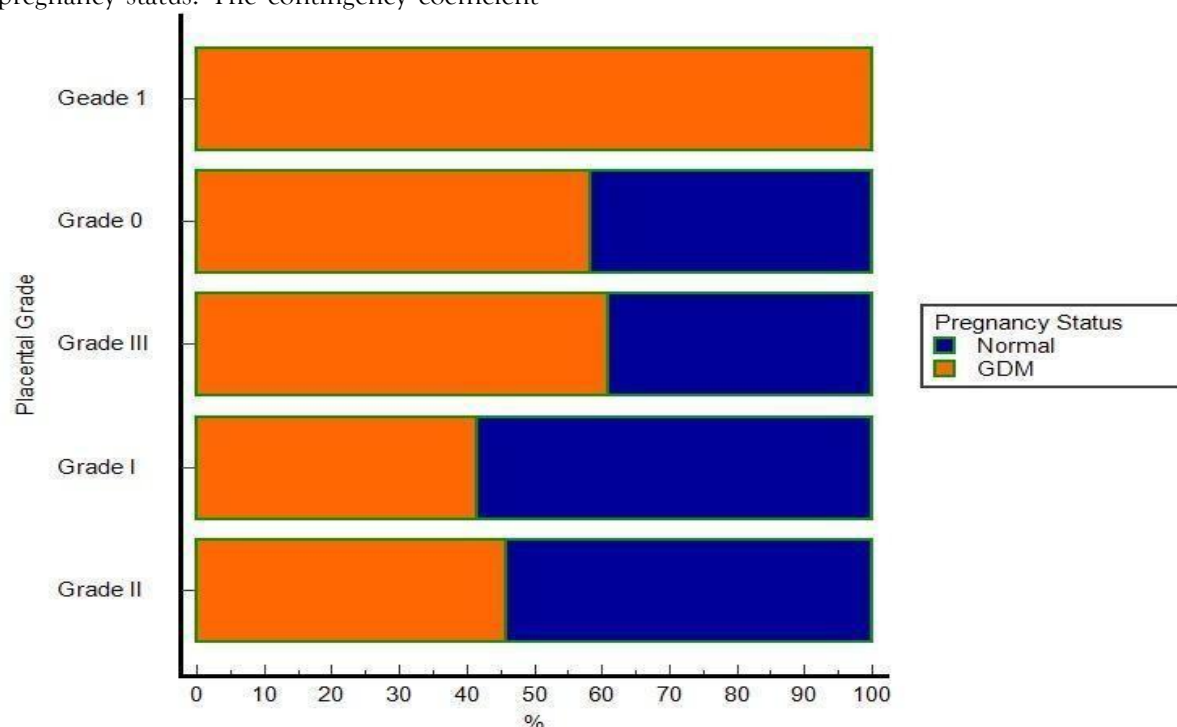
pregnancies. Among GDM patients, 1 patient had grade 1, 7 had grade 0, 12 had grade I,

16 had grade II, and 14 had grade III. In normal pregnancies, 0 patients had grade 1, 5 had grade 0, 17 had grade I, 19 had grade II, and 9 had grade III. The Chi-squared test value was

3.540 with 4 degrees of freedom (DF). The significance level was P = 0.4719, which shows

that there is **no statistically significant association** between placental grade and pregnancy status. The contingency coefficient

was 0.185, indicating a weak association between the variables.



The bar chart shows the placental grade in normal and GDM pregnancies.

TABLE NO. 6

Chi-squared test

Classification X	Obesity_Status Obesity Status		
Classification Y	Pregnancy_Status Pregnancy Status		
Pregnancy_Status	Obesity_Status		
	No	Yes	
GDM	35	15	50 (50.0%)
Normal	27	23	50 (50.0%)
	62 (62.0%)	38 (38.0%)	100

Chi-squared test

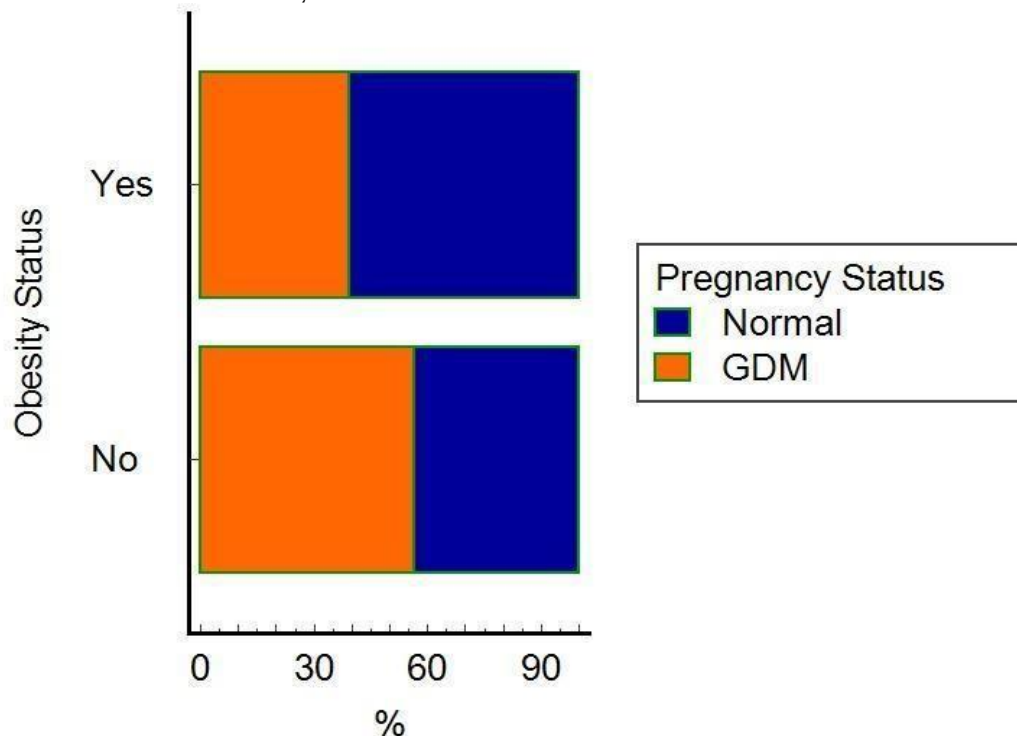
Chi-squared	2.689
DF	1
Significance level	P = 0.1010
Contingency coefficient	0.162

Table No. 6 presents the relationship between **obesity status** and **pregnancy status** among the study participants. A total of 100 participants were included, with equal distribution of 50% having **Gestational Diabetes Mellitus (GDM)** and 50% having **normal pregnancy**. Among the **GDM group**

(**n** = 50), 35 participants (35%) were classified as obese, while 15 participants (15%) were non-obese. In the **normal pregnancy group** (**n** = 50), 27 participants (27%) were obese and 23 participants (23%) were non-obese. Overall, out of 100 participants, 62 (62%) were obese and 38 (38%) were non-obese. The Chi-square

test was applied to assess the association between obesity and pregnancy status. The results showed a Chi-square value of 2.689 with 1 degree of freedom and a p-value of 0.1010. Since the p-value is greater than 0.05, the association between obesity status and

pregnancy status is **not statistically significant**. Furthermore, the **contingency coefficient value of 0.162** indicates a **weak association** between obesity status and pregnancy status in this study population.



The bar chart shows the obesity status in normal and GDM pregnancies.

TABLE NO. 7

Chi-squared test

Classification X	Placental_Echogenicity Placental Echogenicity			
Classification Y	Pregnancy_Status Pregnancy Status			
Pregnancy_Status	Placental_Echogenicity			
	Heterogeneous	Mildly Increased	Normal	
GDM	23	18	9	
Normal	0	0	50	50 (50.0%)
	23 (22.0%)	18 (18.0%)	59 (59.0%)	100

Chi-squared test

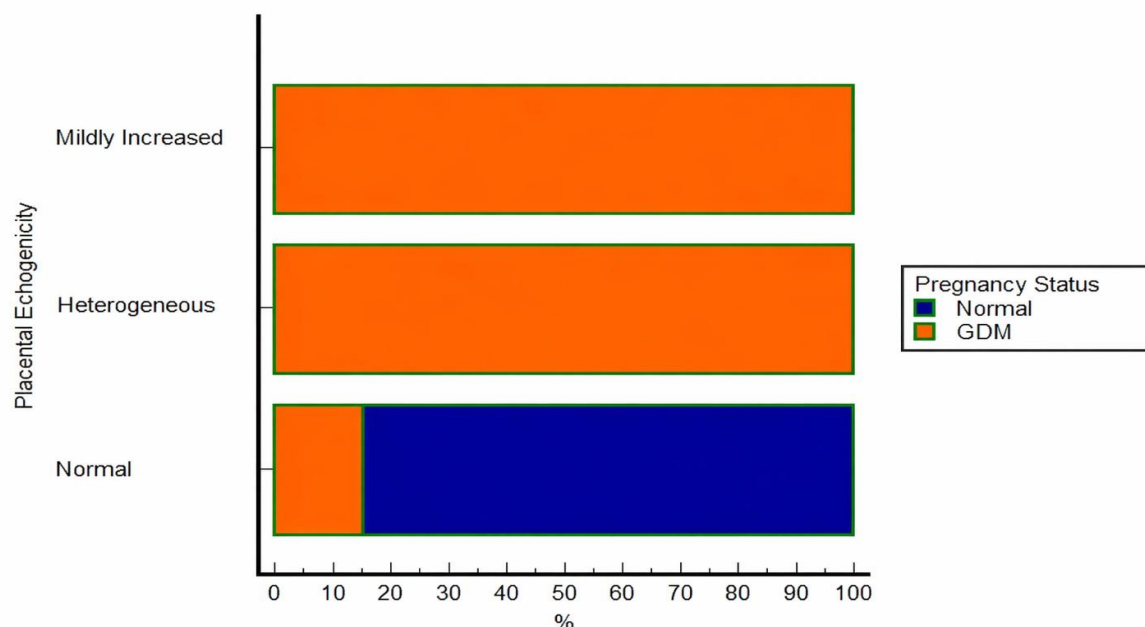
Chi-squared	69.492
DF	3
Significance level	P < 0.0001
Contingency coefficient	0.640

Table No. 7 illustrates the association among placental echogenicity (Variable 1) and pregnancy status (Variable 2), which includes GDM and normal pregnancies. The total

sample size consists of 100 participants, with 50 participants in each group. In the GDM group (n = 50), 1 participant showed heterogeneous echogenicity, 22 showed

heterogeneous pattern, 18 showed mildly increased echogenicity, and 9 had normal placental echogenicity. In the **normal pregnancy group (n = 50)**, all 50 participants showed normal placental echogenicity, while no cases of heterogeneous or mildly increased echogenicity were observed. Overall, the distribution shows that 1% had **heterogeneous (abnormal) echogenicity**, 22% **heterogeneous pattern**, 18% **mildly increased echogenicity**, and 59% **normal echogenicity** among the total study population. The Chi-square test was applied to assess the

connotation among placental echogenicity then pregnancy status. The results showed a **Chi-square value of 69.492 with 3 degrees of freedom**. The **p-value was < 0.0001**, which indicates a **highly statistically significant association** between placental echogenicity and pregnancy status. Furthermore, the **contingency coefficient value of 0.640** suggests a **strong association** between placental echogenicity and pregnancy status in the studied population.



The bar chart shows the placental thickness between normal and gestational diabetic pregnancies.

In our results, out of 100 patients, 50 were normal and 50 were gestational diabetes mellitus GDM patients. Out of 50 ,23 patients show heterogenous parenchyma, only 18 shows mild increased parenchyma, 9 patients with GDM shows normal parenchyma while in normal pregnancies all 80 patients show normal placental echogenicity. On the other hand, placental thickness with GDM is high (arithmetic mean= 44.0) as compared to normal pregnancies (arithmetic mean= 30.1). Standard deviation for both samples is 9.03 and 8.02 respectively. Results were significant

because two-tailed probability P value is less than 0.0001.

DISCUSSION

A common metabolic condition during pregnancy, gestational diabetes mellitus (GDM) can have a major impact on the health of both the mother and the fetus. Through the exchange of nutrition, oxygen, and waste products between the mother and fetus, the placenta is an essential organ that supports fetal growth and development. Hyperglycemia in the mother can cause structural and functional abnormalities in the placenta that can impair its function in pregnancies affected by gestational diabetes mellitus (GDM). These

alterations could show up on ultrasound as variations in placental thickness and echogenic patterns. Sonography is a safe, noninvasive, and easily accessible imaging technique that enables evaluation of placental shape in real time and can be used to identify such anomalies. Evaluating and comparing placental echogenicity and thickness in normal and GDM pregnancies is therefore important for early identification of placental dysfunction and for improving maternal and fetal outcomes through timely clinical management. In our results, out of 100 patients, 50 were normal and 50 with gestational diabetes mellitus. GDM patients out of 50 23 patients shows heterogeneous parenchyma, only 18 shows mild increased parenchyma, 9 patients with GDM shows normal parenchyma while in normal parenchyma all 80 patients show normal placental echogenicity.

On the other hand, placental thickness with GDM is high (arithmetic mean = 44.0) as compared to normal pregnancies (arithmetic mean = 30.1). Standard deviation for both samples is 9.03 and 8.02 respectively. Results were significant because two-tailed probability P value is less than 0.0001.

Acar Sirinoglu et al., 2022 used Shear wave elastography (SWE) to evaluate the placental elasticity of patients with gestational diabetes mellitus (GDM) with and without insulin to non-diabetic controls. The following three groups were formed: Group 2 (n = 90, GDM with only diet), Group 3 (n = 150, healthy controls), and Group 1 (n = 79, GDM with insulin therapy). Every patient had an anterior placenta and was older than 36 weeks gestation. Additionally, the clinical study number (NCT04455880) was obtained. Group 3 had the lowest C/S rate, while Group 1 had a higher BMI. GDM groups had birthweights that were statistically considerably higher than controls (p = .001). Group 1 exhibited greater rates of admission to the newborn intensive care unit (NICU), despite the lack of a meaningful difference in APGAR ratings.

Compared to controls, GDM patients receiving insulin or diet had significantly

higher SWE readings. While 50 of the 100 individuals in our study were normal and 50 had gestational diabetes mellitus, SWE may be an alternate supplemental care method for GDM. Of the 50 individuals, 23 have heterogeneous parenchyma, only 18 have somewhat elevated parenchyma, 9 have GDM, and all 80 have normal placental echogenicity in normal pregnancies.

On the other hand, placental thickness with GDM is high (arithmetic mean = 44.0) as compared to normal pregnancies (arithmetic mean = 30.1). Standard deviation for both samples is 9.03 and 8.02 respectively. Results were significant because two-tailed probability P value is less than 0.0001.

Pala et al., 2016 conducted a study whereby mean gray levels do not considerably change but placental volume increases significantly in GDM. The placental alterations in GDM placentas may be reflected in these findings, which could aid in a better understanding of the pathogenesis. GDM patients had a substantially higher placental volume (411.59 ± 170.82 versus 343.86 ± 128.94 cm³; p = 0.046). The mean gray value of GDM and healthy placentas did not differ significantly (36.65 ± 7.02 versus 38.71 ± 7.91 , respectively; p = 0.277). There was a significant correlation between placental volume and both parity (r = 0.228, p = 0.048) and gestational week (r = 0.219, p = 0.035). Placental volume was negatively correlated with the umbilical artery systolic/diastolic ratio, pulsatility index, and resistance index (r = -0.278, p = 0.007; r = -0.315, p = 0.002; r = -0.322, p = 0.001, respectively). Of the 100 patients in our study, 50 were normal and 50 had gestational diabetes mellitus. Only 23 of the 50 patients have heterogeneous parenchyma. 18 shows mild increased parenchyma, 9 patients with GDM shows normal parenchyma while in normal pregnancies all 80 patients show normal placental echogenicity.

On the other hand, placental thickness with GDM is high (arithmetic mean = 44.0) as compared to normal pregnancies (arithmetic mean = 30.1). Standard deviation for both samples is 9.03 and 8.02 respectively. Results were significant

because two-tailed probability P value is less than 0.0001.

Abdelhaleem, et al., 2020 conducted research which focus on the effects of diabetes on the placenta during the second and third trimesters as well as typical collaret findings. Placenta grade, location, and thickness in diabetic pregnancy were found to be significantly correlated with normal pregnancy, according to the study. The purpose of this descriptive study was to use ultrasonography to examine the impact of diabetes on the placenta during the second and third trimesters. This study was conducted between March 2020 and December 2020 at Omdurman Maternal Hospital in Khartoum, Sudan. One hundred pregnant women with diabetes were enrolled, while a control group of one hundred pregnant women without diabetes was closed. The ultrasonography procedure was used to prolong all of them. The Mindray ultrasound machine was used to perform the scan. The placenta has been assessed for thickness, location, and grade. In our study, out of 100 patients, 50 were normal and 50 had gestational diabetes mellitus (GDM). The study revealed significant changes among placenta grading in the diabetic group and control group at p-value 0,000, as well as placenta site at p-value 0,037 and placenta thickness at p-value 0,000. Of the 50 individuals, 23 have heterogeneous parenchyma, only 18 have somewhat elevated parenchyma, 9 have GDM, and all 80 have normal placental echogenicity in normal pregnancies.

On the other hand, placental thickness with GDM is high (arithmetic mean= 44.0) as compared to normal pregnancies (arithmetic mean= 30.1). Standard deviation for both samples is 9.03 and

8.02 respectively. Results were significant because two-tailed probability P value is less than 0.0001.

CONCLUSION:

The study concludes that there is a significant difference in placental characteristics between normal and gestational diabetic pregnancies. Placental thickness was found to be significantly higher in GDM patients

compared to normal pregnancies ($P < 0.0001$), indicating structural changes associated with maternal hyperglycemia. Additionally, placental echogenicity showed a statistically significant association with pregnancy status ($P < 0.0001$), with GDM cases demonstrating more heterogeneous and increased echogenic patterns, while normal pregnancies mostly showed normal echogenicity. However, factors such as placental location, grade, and obesity status did not show significant differences. Advantageously, the ultrasonic assessment of placental thickness and echogenicity may be regarded as an easy, non-invasive procedure for evaluating the gestational diabetes and its effect on placenta.

LIMITATIONS

- The study included a limited sample size, which may affect the generalizability of the results.
- Data was collected from a single healthcare center, limiting representation of the broader population.
- Only basic sonographic parameters (placental thickness and echogenicity) were evaluated, while advanced techniques like Doppler or elastography were not included.
- Maternal factors such as level of glycemic control and lifestyle were not fully evaluated.

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