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Frequency of Diabetic and Non-diabetic patients having fetal anomalies at 3rd trimester using ultrasound

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***Abstract*---**Background: Pre-gestational or gestational diabetes in pregnancy is now more common among pregnant mothers as a result of the obesity pandemic. Objective: To determine frequency of diabetic and non-diabetic patients having fetal anomalies at 3rd trimester using ultrasound. Methodology: Descriptive study was conducted at radiology department Chughtai Lab, Lahore. About 250 Diabetic and Non-Diabetic pregnant women of all age were included in this study. Consecutive sampling technique was used Data was analyzed by SSPS version 24.0. All quantitative variables were reported in mean ± S.D were presented in frequency and percentage and bar charts were presented. Results: The mean age of 250 participants was 28±5.1 with minimum age of 15 years and maximum age of 45 years. Out of 250 participants, 210(84%) had no Gestational Diabetes Mellitus and 40(16%) had Gestational Diabetes Mellitus. Out of 250 patients, 204(81.6%) had adequate Amniotic Fluid Index value, 27(10.8%) had Oligohydramnios and 19(7.6%) had Polyhydramnios. In our study 16(6.4%) diabetic patients and 26(10.4%) non-diabetic patients have anomalies. Conclusion: The study concluded that frequency of anomalies doesn't depend on patients being diabetic or non-diabetic. As in our study diabetic patients are lesser anomalies than the non-diabetic patients.

***Keywords*---** Pre-gestational, gestational diabetes, Oligohydramnios

Introduction

Diabetes mellitus, a form of the metabolic syndrome, is characterized by hyperglycemia brought on by either inadequate insulin production or decreased insulin action.[1]Maternal hyperglycemia, which has detrimental effects on embryo development, significantly increases the prevalence of congenital malformations in humans.[2]Maternal hyperglycemia complicates 17% of pregnancies, and as a result, both the mother and the baby have a variety of negative delivery outcomes.[3] One of the negative impacts of maternal hyperglycemia on embryogenesis and fetal development is stillbirth. In children of diabetic moms, the probability of congenital malformations is directly associated with hyperglycemia during gestation.[4]Gestational diabetes is characterized by low blood sugar levels throughout pregnancy; it frequently goes away after birth. In the second trimester, it becomes more frequent.[5]The risk of birth malformations, neonatal abnormalities, and even fetal death is known to rise in relation to a mother's glucose intolerance.[6]It mainly cause due to imbalance diet. Although Gestational Diabetes related to high blood glucose during pregnancy and effect both mother and child.LGA was 50% in T1DM-suffering women and 23% in T2DM-suffering women.[7] First-trimester ultrasound increases the chance of doing an early anatomic scan and increases the window of opportunity for foetal

monitoring.[8]The technique utilised for pregnancy that is most frequently employed is two-dimensional ultrasonography.[9]In clinical practice, ultrasonography is frequently used to estimate foetal weight.[10]Even in non-diabetic women, pregnancy has a diabetogenic effect because it affects both the mother's and the foetus' metabolisms.For pregnant women with gestational diabetes, diet and lifestyle modifications are frequently the first line of treatment. Females by type 2 diabetes are advised to use insulin therapy.[11] DM complicate the study of ultrasound in pregnancy while monitoring estimated fetal weight and diagnose of congenital malformation. By using such low cost technologies (ultrasound) we can handle further neonatal complications and foetus complications.[12] Pre-gestational or gestational diabetes in pregnancy is now more common among expecting mothers as a result of the obesity pandemic. Both prenatal and postpartum diabetes cause a number of motor and behavioral neurodevelopmental issues, such as a rise in the prevalence of ADHD and autism spectrum disorder.[13] Several technical challenges to ultrasound accuracy often exist in the diabetic pregnant patient. Ultrasound is known to be less accurate with increasing fetal weight and at later gestational ages.[14]Macrosomia over-diagnosis may result in unwarranted elective caesarean sections or other procedures.[15] At 26 to 28 weeks of pregnancy, diagnostic testing is typically started with an oral glucose tolerance test (OGTT), as this is when there are observable increases in insulin resistance.[16] Nephropathy, persistent hypertension, preeclampsia, premature birth, and fetal development restriction are frequently seen in women with diabetic vasculopathy.[17] In modern obstetric practice, the identification of small-for-gestational-age (SGA) infants sometimes involves the use of ultrasonography.[18] Women are not routinely screened in late pregnancy in the USA, the UK, or many other countries; instead, they are chosen for third trimester ultrasounds based on pre-pregnancy risk factors, the development of obstetric problems, and repeated measurements of symphyseal-fundal height.[19] To prevent immediate and long-term harm to women and children, a pregnancy complicated by type 1 or type 2 diabetes, or by GDM (diabetes with onset or first detection during pregnancy), requires interdisciplinary treatment from an endocrinologist, obstetrician, and pediatrician.[20]Ultrasound allows accurate estimation of GA determination of viability and presentation position of the placenta, measurement of amniotic fluid index ,estimated fetal weight and some fetal abnormalities. The aim of our study was to determine frequency of diabetic and non-diabetic patients having fetal anomalies at 3rd trimester using ultrasound.

Methods

It was a cross-sectional study performed to find out the frequency of diabetic and non-diabetic patients having fetal anomalies at 3rd trimester using ultrasound.

The study was conducted at radiology department of Chughtai Lab. The data was collected in four months. A sample size of 250 patients was calculated by using 95% power of test, 5% level of significance the expected sensitivity,n = 250. For two groups, 250 patients were included. Non probability, consecutive sampling technique was used. The diabetic and non-diabetic pregnant women and pregnant women of all ages were included. Siemens Sonovista c3000 Grey Scale Ultrasound Machine was used to analyse the images. MS Excel and SPSS version

24 were used to tabulate and analyze the data. Analyses that were descriptive were used to report the data. All quantitative variables were reported in mean ± S.D. The qualitative data were presented in frequency and percentage. Bar charts, pie charts were presented.

Results

This Descriptive study was conducted during the period of 6 months after the approval of synopsis at the Radiology Department of Chughtai Lab, Lahore. The mean age of 250 participants was 28±5.1 with minimum age of 15 years and maximum age of 45 years.

Table 1: Gestational Diabetes Mellitus, Amniotic Fluid index and other findings

		Frequency	**Percent**
Gestational Diabetes Mellitus	**No**	210	84%
	Yes	40	16%
Amniotic Fluid Index	**Adequate**	204	81.6%
	Oligohydramnios	27	10.8%
	Polyhydramnios	19	7.6%
Other Findings	**Macrosomia**	15	6%
	Meconium stained amniotic fluid	1	0.4%
	Microsomia	5	2.0%
	Normal	228	91.2%
	Still birth	1	0.4%

Out of 250 participants, 210(84%) had no Gestational Diabetes Mellitus and 40(16%) had Gestational Diabetes Mellitus. Out of 250 participants, 204(81.6%) had adequate Amniotic Fluid Index value, 27(10.8%) had Oligohydramnios and 19(7.6%) had Polyhydramnios. Out of 250 participants, 15(6%) had macrosomia, 5(2.0%) had microsomia, 228(91.2%) were normal, 1(0.4%) had still birth and 1(0.4%) had meconium stained amniotic fluid.

Table 2: Anomalies

Anomalies	Frequency	Percent
Hydrocephalus	7	2.8%
Ventriculomegaly	9	3.6%
Spina bifida	3	1.2%
Hydrops fetalis	3	1.2%
Encephalocele	3	1.2%
Hydronephrosis	1	0.4 %
Hydrocele	1	0.4%
Scalp edema	1	0.4%
Club foot	1	0.4%
Bladder outlet obstruction	3	1.2%
IUGR	2	0.8%
Cystic hygroma	1	0.4%
Infantile polycystic kidneys	3	1.2%
Short femur	2	0.8%
Polydactyly	1	0.4%
Ascites	1	0.4%
No	208	83.2 %
Total	250	100.0 %

Out of 250 participants, 208(83.2%) had no fetal anomaly, hydrocephalus 7(2.8%), ventriculomegaly 9(3.6%),spina bifida 3(1.2%),hydrops fetalis 3(1.2%),encephalocele 3(1.2%), hydronephrosis 1(0.4%), hydrocele 1(0.4%), scalp edema 1(0.4%), club foot 1(0.4%), bladder outlet obstruction 3(1.2%), IUGR 2(0.8%), cystic hygroma 1(0.4%), infantile polycystic kidneys 3(1.2%), short femur 2(0.8%), polydactyly 1(0.4%), ascites 1(0.4%).

Discussion

The purpose of the study was to determine the frequency of foetal anomalies in pregnant women with and without diabetes throughout the third trimester. There are two sections to the data gathering. Patient's demographics and clinical symptoms are covered in the first section, while sonographic transabdominal sonographic findings are covered in the second. Almost any fetal organ can exhibit a variety of abnormalities as a result of PGD. Compared to women without PGD, women with PGD have a greater risk of giving birth to children who have birth abnormalities, which can range from 2.7% to 18.6% in prevalence.[5,12,17] having a 2% to 3% birth defect prevalence18. Prevalence rates for type 1 and type 2 pregnancies in another study were 1.8% and 7.5%, respectively. Around 5 to 6%

of pregnant women with gestational diabetes also have fetal abnormalities. As a result, this population has a high burden risk of developing diabetic embryopathy.[21,22] According to additional studies, the main concerns for the fetus of a diabetic woman include congenital deformities, intrauterine death, which typically occurs after 30 weeks, and macrosomia, which may cause serious issues for both mother and child during labor.[23] Abourawi FI et al., 2006 conducted a study there were 146 pregnant women without diabetes and 75 pregnant women with diabetes. In the diabetic group, foetal macrosomia occurred 60% of the time, compared to 10.3% of the time in the non- diabetic group.[24] Kallem VR in 2020 conducted a study has been discovered that infants of moms with pre-GDM had the highest risk of both single and multiple congenital abnormalities. As compared to our study we found opposite results congenital anomalies were prevalent in non-diabetic mothers.[25] As in our studywe didn't have found a high chance to have a congenital anomalies in infant so our rate of congenital anomalies are low in diabetic patients compared to non-diabetic respectively.

Other research carried out to the conclusion that pregnant diabetes women are more likely to have foetal cardiac abnormalities. In comparison with our study, there were only 1% cardiac anomalies were found.[26] Syngelaki et al did a study at 11–13 weeks, ventriculomegaly, cleft lip, ventricular septal defect, renal agenesis or multicystic kidney, hydronephrosis, duplex kidney and talipes were common abnormalities that were found in 10% of cases.[27] Compared with our findings these abnormalities were found in 6.8% of cases. Moree GS et al concluded that, thesensitivity for macrosomia prediction was 19%, while in the second group, it was 45%.In contrast with our study, 9(3.6%) had macrosomia, 5(2.0%) had microsomia.[28] Other related study by Riskin A et al concluded that pregnancies with diabetes were associated with higher rates of polyhydramnios or macrosomia.[29]As contrast with our findings we concluded that rateof macrosomia and polyhydramnios is not very high in diabetic women. Hina GE et al., in 2022 in her study stated that Out of a total of 700 women, 60(8.1%) were diagnosed as GDM and studied. Their minimum age was 21 years and maximum age was 40 years, the mean age was 32±4.04 years.[30] Compared to our investigation, the mean age of 250 women was 28±5.1 with minimum age of 15 years and maximum age of 45 years. We discovered comparable outcomes gestational complications include Spina bifida, hydronephrosis, polyhydromnios, and many more and these are more common in non-diabetic women. Despite some differences in the literature review, as mentioned above it is seems that gestational diabetes put mother and the fetus at risk of abnormalities. We concluded that women with diabetes have lesser anamolies than non-diabetic.

Thus both diabetic and non-diabetic women with anomalies require proper care and follow up monitoring.

Conclusion

The study concluded that frequency of anomalies doesn't depend on patients being diabetic or non-diabetic. As in our study diabetic patients are lesser anomalies than the non-diabetic patients.

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