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Original Article

Sonographic Evaluation of Fetal Complications in Gestational Diabetes During 3rd Trimester of Pregnancy

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ABSTRACT

Gestational Diabetes (GDM) is becoming more common everywhere around the globe. **Objective:** To sonographically assess the complications of gestational diabetes in fetuses associated with gestational diabetes during 3rd trimester of pregnancy **Methods:** A cross-sectional investigation has been carried out in Mother Care Hospital, Gujranwala. All subjects signed an informed consent form in written prior to ultrasound examination. 700 participants were enrolled in this study, among them 60(8.1%) pregnant women during 3rd trimester and at term diagnosed with GDM by glucose tolerance tests as diabetics. Patients were 29.5 years old on average, and the average Gestational age was 30.4 weeks. Estimated fetal weight was derived from ultrasound measures using the Hadlock2 equation. Patients were assessed for eligibility in inclusion criteria. **Results:** 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. Other studies have found that increasing maternal age is connected with an increase in the prevalence of GDM. Among the studied cases, most frequent complication was macrosomia 27(45%) and 12(20%) have no fetal complication by GDM. LGA 7(11.7%), polyhydramnios 5(8.3%), SGA and placental changes 3(5%), SGA 2(3.3%) and placental changes 2(3.3%) was evaluate. **Conclusion:** 8.1 percent of pregnant women were diagnosed with GDM. The majority of the ladies were beyond the age of 25 and had many children. Macrosomia and Polyhydramnios were the most prevalent fetal complications, hence caesarean surgery was a typical technique of birth.

INTRODUCTION

Gestational Diabetes Mellitus (GDM) is characterized as glucose intolerance that develops or is discovered during gestational time period. Overall, the prevalence of GDM prevalence normally ranges between 2 and 6%, although it can be substantially higher in certain groups; there is a general trend toward rising prevalence [1]. The prevalence and risk factors of GDM, as well as its influence on maternal and newborn outcomes in the population, are being studied in more depth, as are the benefits of GDM's present universal screening. GDM is a laboratory plasma glucose measurement that is abnormal, not a disease. Therefore, general conclusions cannot be drawn, especially since subgroups analysis show inter-population differences, particularly according to ethnicity [2]. The recent increase in the frequency of GDM has been considered to be an artefact of universal screening, with no indication of benefit to pregnancy outcomes [3]. The incidence of GDM in the overall population varies according to the origin country and the indigenous people's nature [4]. Pre-eclampsia (18%), polyhydramnios (4.8%), and impending

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abortion (3.5%) were the most common maternal problems. Fetal problems included macrosomia (15.1%), intrauterine growth retardation (7.2%), and intrauterine deaths (5.5%) were noted [5]. The premise for using ultrasonography for pregnant diabetic women is the early detection of congenital abnormalities and the observation of abnormal fetal development [6]. Furthermore, ultrasonography gives a tool for assessing the baby's aberrant development and weight in order for the baby to be born at period. This editorial investigates how ultrasonography can assist clinicians in treating a diabetic pregnancy [7]. Perinatologists are particularly concerned in fetal growth and development in diabetic women. The glucose will transfer to the fetus and produce increased insulin generation in the fetus in diabetics, pregnancy, and due to maternal hyperglycemia. This fetal hyperinsulinemia will affect insulin-dependent organs and result in macrosomia[8]. Macrosomia is currently defined as a baby weight of 4,500 g or more. Figure 1, In diabetic individuals, macrosomia is a big problem [9]. The intervention group had 4.3 percent macrosomia compared to 13% women with hyperglycemia discovered during pregnancy are more likely to have unfavorable pregnancy outcomes, including such macrosomia of the baby and increased perinatal death in children of GDM female, demonstrating the necessity of diagnosing and treating gestational diabetes [10]. GDM has been associated with numerous of pregnancy complications, the most common of which are fetal hyperinsulinism, macrosomia, and increased fetal growth, because maternal blood sugar have been highly related with the risk of increasingly rapid fetal development growth and neonatal morbidity [11].

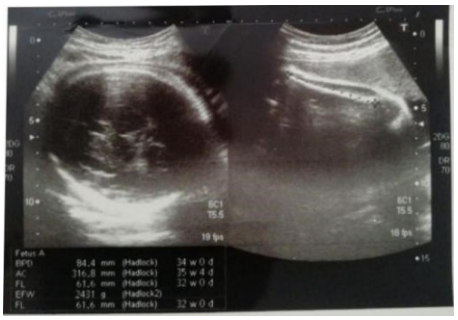

Figure 1: Obstetrical ultrasound shows macrosomia in 32 weeks of gestation

Ultrasound can detect fetuses at low hazard for macrosomia and associated perinatal issues in women who come with fasting low blood sugar in the range of 106–120 mg/d [12]. However, fetal abdominal circumference enlargement and faster growth velocity in the 3rd trimester are believed to indicate large gestational age (LGA) body mass [13]. Furthermore, whereas the amniotic fluid index AFI falls in non-diabetic moms from late mid-trimester to late pregnancy, it remains stable in diabetes mothers throughout the third trimester. However, predicting macrosomia solely on the basis of the AFI parameter is problematic. It is, however, tough to estimate macrosomia just utilizing the AFI parameter [14]. The major hormone involved for intrauterine fetal development is known to be maternal insulin [15]. Body Mass Index (BMI) was expressed, the weight in kilogram divided by the body height in meters square (kg / m2) and regarded as per the WHO guide as underweight (18kg / m2), normal weight (18.5-25 kg / m2), overweight (25-30 kg / m2), and obese (30.0 or above kg / m2) [16]. GDM treatment is useful in lowering macrosomia, major during gestation, shoulders dystocia, or pre-eclampsia and hypertensive problems in the pregnancy [17]. It is generally known that prenatal morbidity and death are higher in diabetes pregnancies than in nondiabetic pregnancies [18]. USG is the best modality of choice Perinatologists are concerned with fetal growth and development in diabetic women. Most obstetricians, if not all, depend on U/S to calculate estimated fetal weight (EFW)[19].

METHODS

A cross-sectional investigation has been carried out in Mother care hospital, Gujranwala. All subjects signed an informed consent form in written prior the ultrasound examination. A sample size of 60 was estimated. The sample size was calculated using the 95% confidence level, 0.05 absolute precision, and the estimated percentage of fetal problems in gestational diabetes as 0.96 (20). 700 patients underwent in this study, among them 60(8.1%) pregnant women during 3rd trimester and at term diagnosed with GDM by glucose tolerance tests as diabetics and calculated. Patients were 29.5 years old on average, and the average Gestational age was 30.4 weeks in those patients. Estimated fetal weight was derived from ultrasound measures using the Hadlock2 equation. Patients were assessed for eligibility in inclusion criteria. Inclusion Criteria: was all pregnant females of 3rd trimester and term, all age groups would include and Singleton pregnancy. Exclusion Criteria of this study was Twins pregnancy and Congenital anomalies. Doppler ultrasound machine (Toshiba) frequency ranging 3 to 7.5 MHz was used. All pregnant females were assessed according to eligibility in inclusion criteria. Patients who were not meeting the inclusion criteria was excluded and that non-consented patients were bared who were not meeting the consideration standards. Fetal complications diagnosed by GDM were monitored according to a data collection sheet and ultrasonography. Random blood sugar was

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checked by glucometer for separation of GDM patients after sonographic assessment. Pre-delivery inspections were done for maternal complications. Collected data was analyzed.

RESULTS

A cross-sectional study of 60 pregnant women in their third trimester and at term was conducted. The average patient age was 29.5 years, and the average GA was 30.4 weeks in those patients. We scanned 700 pregnant females and among them 60 pregnant females during 3rd trimester and at term have GDM. Data of these 60 participants was analyzed and their minimum age was 21 years and maximum age was 40 years. The mean ±SD of age was 32± 4.04 years as shown in table 1. According to descriptive statistics, the calculated minimum maternal BMI was 18.00 kg/m^2 and maximum was 27kg/m^2 with average of 23±2.03 kg/m^2 and maternal BSR with minimum and maximum of 191 mg/dl and 378 mg/dl respectively, with average of 251±50.36mg/dl, as shown in Table 1.

Descriptive Statistics	N	Range	Maximum	Minimum	Mean+SD	
Age	60	18.00	22.00	40.00	32.2500	4.04896
Maternal BMI	60	9.00	18.00	27.00	23.0283	2.03745
Maternal BSR	60	187.00	191.00	378.00	251.1333	50.36526

Table 1: Descriptive Statistics of age, maternal BMI and BSR

Frequency of GDM with respect to GA	
weeks	GDM (%)
24.00	1(1.7)
25.00	1(1.7)
26.00	2(3.3)
27.00	4(6.7)
28.00	6(10.0)
29.00	6(10.0)
30.00	9(15.0)
31.00	9(15.0)
32.00	8(13.3)
33.00	4(6.7)
34.00	2(3.3)
35.00	3(5.0)
36.00	2(3.3)
37.00	2(3.3)
38.00	1(1.0)
Total	60(100.0)

Table 2: Frequency of GDM with respect to Gestational age

Fetal complication on USG	
Fetal complications	Frequency (%)
LGA	7 (11.7)
Macrosomia	27(45.0)
Macrosomia and LGA	1(1.7)
Macrosomia and polyhydoamnios	1(1.7)
No complication	12(20.0)
Placental changes	2(3.3)
Polyhydoamnios	5(8.3)
SGA	2(3.3)
SGA and Placental changes	3(5.5)
Total	60(100.0)

Table 3: Frequency of fetal complications on USG

Table 4 illustrates the Correlation between BMI Group, Fetal complication on USG, Previous Unexplained fetal demise and Family history of diabetes. In this table among 60 patients 32 have no history of previous unexplained fetal demise and no family history of diabetes under 23-27 BMI group. Rest of 21 patients have history of previous unexplained fetal demise and family history of diabetes under 18-22 BMI group.

Correlation between BMI Group, Fetal complication on USG, Previous Unexplained fetal demise and Family history of diabetes						
Family history of diabetes	Previous Unexplained fetal demise			Fetal complication on USG		
				MACROSOMIA	POLYHYDO AMNIOS	Total
NO	NO	BMI Group	23—27	32	0	32
		Total		32	0	32
	Total	BMI Group	23—27	32	0	32
		Total		32	0	32
YES	NO	BMI Group	18—22	21	0	21
			23—27	0	7	7
		Total		21	7	28
	Total	BMI Group	18—22	21	0	21
			23—27	0	7	7
		Total		21	7	28
Total	NO	BMI Group	18—22	21	0	21
			23—27	32	7	39
		Total		53	7	60
	Total	BMI Group	18—22	21	0	21
			23—27	32	7	39
		Total		53	7	60

Table 4: Correlation between BMI Group, Fetal complication on USG, Previous Unexplained fetal demise and Family history of diabetes

DISCUSSION

This was a cross-sectional study of 60 pregnant women during 3rd trimester and at term. Among those cases, the mean patient age was 29.5 years and the mean GA was 30.4 weeks. We scanned 700 pregnant females and among them 60(8.1%) pregnant females during 3rd trimester and at term have GDM. We analyzed our data of these 60 patients and their minimum age was 21 years and maximum age was 40 years. The mean ±SD of age was 32±4.04 years. Increase in maternal age was associated with higher frequency of GDM, which was in accordance with other studies [21]. The mother's advanced age is a well-defined risk factor for the development of GDM [22]. Zargar et al. demonstrated 1.7% prevalence of gestational diabetes in subjects belonging to Indian subcontinent and aged less than 25 years. These findings are much in line with low prevalence of gestational

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diabetes observed in our study. The authors believe that our study has several positive attributes that could explain the extremely low incidence rate of gestational diabetes mellitus [23]. According to descriptive statistics, the calculated minimum maternal BMI was 18.00 kg/m^2 and maximum was 27 kg/m^2 with average of 23±2.03kg/m^2 and maternal BSR with minimum and maximum of 191 mg/dl and 378 mg/dl respectively, with average of 251±50.36mg/dl. Our study agrees with Ali Jawa et al., that the average BMI of the subjects was 24 of their study, suggesting a normal pre-pregnancy body weight. Pre-gravid BMI is a known predictor of development of gestational diabetes with far reaching metabolic implications. Frequency distribution of patient age of 60 females with average age of 32±4.04 years in 24weeks of G.A there was 1(1.7%) patient lie. Similarly, in 26,27,28,30,32,36 weeks there was 2(3.3%), 4(6.7%), 6(10%), 9(15%), 8(13.3%) and 2(3.3%) patients lie respectively and the mean of GA was 30.4 weeks [24]. The frequency of fetal complication followed by GDM in 60 pregnant patients during third trimester of pregnancy and term. Among the studied cases, most frequent complication was macrosomia 27(45%) and 12(20%) have no fetal complication by GDM. LGA 7(11.7%), polyhydramnios 5(8.3%), SGA and placental changes 3(5%), SGA 2(3.3%) and placental changes 2(3.3%) was evaluate. Present study agrees with the Akin Usta et al., who concluded that there was an increased incidence of macrosomic newborns in the world. Out of 4246 pregnant women were 399 diagnosed with fetal macrosomia (8.6%). Compared with control women, statistically correlation between fetus macrosomia and pre-pregnancy BMI, gestational weight gain, proportion, age of mother, and gender of male child. Maternal BMI and GWG were the two risk factors most strongly associated with macrosomia. Our study also agrees with the Farooq, Ayaz et al., who concluded that total of 1429 women delivered, 50(3.5%) were diagnosed as GDM and studied. Most frequent fetal complications were polyhydramnios 9(18%) and macrosomia 18(36%). Macrosomia and jaundice were most prominent complications among neonates [20]. The reported incidence of macrosomia is 25-40%, comparable to our study with 27% but more in another developing world study, i.e. 46.6% [25]. this high figure in the current study might be due to the effect of hyperglycemia which largely manifests in the third trimester, leading to fetal overgrowth during that period [26]. And in lower rates of LGA and SGA in a study by Bonomo et al. [27]. The Correlation between BMI Group, fetal complication on USG, Previous Unexplained fetal demise and Family history of diabetes. In this table among 60 patients 32 have no history of previous unexplained fetal demise and no family history of diabetes under 23-27 BMI group. Rest of 21 patients have history of previous unexplained fetal demise and family history of diabetes under 18-22 BMI group. Compared with control women, statistically correlation between fetus macrosomia and pre-pregnancy BMI, gestational weight gain, proportion, age of mother, and gender of male child. Maternal BMI and GWG were the two risk factors most strongly associated with macrosomia. Our study agrees with the GDM resulted in similar rates of cesarean section, LGA, SGA, neonatal hypoglycemia, and neonatal admission compared to management based on strict glycemic criteria.

CONCLUSIONS

GDM was discovered in 8.1% of pregnant women. The majority of the participants in the trials were above the age of 25, and the majority were multiparous. Polyhydramnios and Macrosomia were the most prevalent fetal complications, hence caesarean surgery was a typical technique of birth. Ultrasound is a noninvasive, generally available technology for assessing and monitoring the fetus, and use of it in diabetes pregnancy is now globally accepted, allowing for early diagnosis of defects by birth and measurement of fetal development to optimize timing and mode of delivery. Future research should compare management regimens addressing appropriate time, frequency of ultrasonography tests, and glycemic objectives. Great trials are with greater sample size required to truly assess the impact of diabetes on pregnant women in Pakistan.

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