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Original Article

Frequency of Macrosomia in Neonates Among Women with Gestational Diabetes Mellitus

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ABSTRACT

One of the most frequent pregnancy complications is gestational diabetes mellitus (GDM), which raises the risk of unfavorable health issues for both mother and fetus. Macrosomia and increased fetal growth are significant contributors to poor perinatal outcomes. **Objective:** To determine the frequency of macrosomia in neonates among women with gestational diabetes mellitus. **Methods:** This Descriptive study was done in Department of Obstetrics and Gynecology, Dow University Health Sciences Karachi from 3rd April 2018 to 2nd october 2018.We enrolled 100 patients meeting the criteria. Informed consent was taken. **Results:** The average age of the patients was 31.16 ± 4.37years, mean gestational age 38.51 ± 2.7 weeks while Mean BMI of the patients was 28.74 ± 1. 3. Frequency of macrosomia in neonates among women with gestational diabetes mellitus was observed in 14%. **Conclusions:** It is concluded that there was a significant number of macrosomia associated with women having gestational diabetes. So, it needs prompt diagnosis and expert management to decrease maternal and fetal morbidity and mortality.

INTRODUCTION

One of the most frequent pregnancy complications is gestational diabetes mellitus (GDM), which raises the risk of unfavorable health issues for both moms and fetuses. Glucose intolerance with onset or first identified in pregnancy" is the definition of gestational diabetes mellitus. Macrosomia and increased fetal growth are significant contributors to poor perinatal outcomes. One major consequence of diabetic pregnancies is macrosomia and can affect up to 30% of the child. Genetics, gestational diabetes, a long gestation, a high pre-pregnancy body mass index, significant gestational weight gain and diabetes mellitus are all risk factors for fetal macrosomia. Risk factors for macrosomia include genetic, sex, racial, and ethnic variables. Male newborns often weigh more than female newborns, and as a result, they make up a larger percentage of babies with birth weights over 4500 gm. The risk of macrosomia also varies by ethnicity, with Hispanic women having a higher risk than white, African American, or Asian women for fetal macrosomia. Newborn birth weight is also influenced by genetic variables including parental height and weight [1]. Cord blood lipid concentration is influenced by maternal lipid and lipoprotein levels. Increased BMI and GDM are also linked to harmful metabolic adaptations, which increase

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the risk of preeclampsia, macrosomia, stillbirth, miscarriage, and macrosomia [Furthermore, placental abnormalities brought on by impaired trophoblast invasion and blood vessel development are present with increased lipid transport in GDM [2]. These people may be predisposed to obesity later in life due to excessive fetal fat deposition, which also raises the chance of an obesity cycle Evidence suggests that atherosclerosis may start at birth, hence measuring the serum lipid levels in cord blood may be crucial. Just the newborn's weight has been employed as a measure of fetal growth in studies comparing the relationship between maternal size and nutrition with neonatal size. Maternal lipids play a significant role in fetal lipids and fetal growth in GDM pregnancies that are well-controlled. Compared to babies with normal growth, those with aberrant growth are likely to experience a distinct intrauterine environment. Preexisting DM and change in maternal glucose regulation are the major contributing factors for gestational diabetes mellitus [3]. The incidence of DM is increasing in women of childbearing age in the United States and accounts for about 7% of the population while a big number id still undiagnosed [4]. According to a study by Stuebe *et al.*, apart from other clinical risk factors, gestational diabetes mellitus results in alteration of metabolic function that even continues three years of postpartum period [5]. The purpose of our study was to determine the frequency of macrosomia in neonates among women with gestational diabetes mellitus.

METHODS

This Cross-Sectional study was done in Department of Obstetrics and Gynecology, Unit-II ward-9, Jinnah Postgraduate Medical Centre, Karachi from 3rd April 2018 to 2nd October 2018. By using WHO calculator with confidence level of 95% with error of margin 7% and anticipated Population around 15% sample size is 100. We enrolled patients 100 patients by using non-probability, consecutive sampling of age of patients 20 to 40 years, and diagnosed cases of gestational diabetes in index pregnancy, gestational age more than 37 weeks as calculated by earlier scan. Singleton gestation diagnosed on ultrasound scan. We excluded Women with diagnosed case of type 1 or type 2 diabetes mellitus (checked from medical record) Congenital abnormalities in baby diagnosed on ultrasound, co-morbid affecting birth weight like Pregnancy induced hypertension, chronic hypertension and SLE assessed on history. After approval from ethical committee of hospital, all 100 patients admitted in the labor room who fulfill the inclusion criteria was enrolled after taking their consent. Detailed history and record were reviewed. Gestational age was calculated from LMP and was confirmed by available earlier scan. Gestational diabetes was labelled after OGTT (oral glucose tolerance test) that defines glucose value of > 153 mg/dL after 2-hour of taking 75-gram oral glucose and macrosomia labelled when fetal birth weight more than 3500 gm. The collected data were analyzed by using SPSS version 22.0. Mean was computed for quantitative variables like age, BMI, gestational age, birth weight. Frequency and percentage were calculated for gender of neonate, gravida and macrosomia. Effect modifier like maternal age, gravida, gestational age and BMI was adjusted through stratification. Chi square test was applied and p-value less than or equal to 0.05 was taken as significant.

RESULTS

A total of 100 women with diagnosed cases of gestational diabetes in index pregnancy were included in this study. Age ranges from 20-40 years with average age of the patients was 30.31 ± 3.5 years, whereas majority lies between 26 to 35 years. Gestational age varies from 37 to 40 weeks with average of 38.51 ± 2.7 weeks while Mean BMI of the patients was 28.74 ± 1.3. The average weight of the neonate was 3.9 ± 4.52 kg as shown in table 1.

Table 1: Descriptive Statistics of Demographic Characteristics

Variables	Range	Mean ± SD
Age (Years)	20-40	30.31 ± 3.5
Gestational Age (Weeks)	37-40	38.51 ± 2.7
BMI (kg/m^2)	27.95-29.54	28.74 ± 1.3
Baby Weight (kg)	3.3-4.8	3.9 ± 4.52

Out of 100 male neonates were 64(64%) and 36(36%) were female neonates. 55(55%) women had history of multigravida while 45(45%) women were primigravida. Frequency of macrosomia in neonates among woman with gestational diabetes mellitus was observed in 14% as shown as shown in table 2.

Table 2: Descriptive Statistics of variables

Variables	Frequency (%)
Gravida	
Primi-gravida	45(45)
Multigravida	55(55)
Gender	
Male baby	64(64)
Female baby	36(36)
Macrosomia	14(14)

Stratification for macrosomia was done with respect to effect modifiers like maternal age, gestational age and BMI, using chi-square test at level of significant 0.05 as shown in table 3.

Table 3: Stratification of macrosomia with variables n=100

Variables	Macrosomia		Total	p-value
	Yes	No		
Maternal Age				
20 -30	9 (16.9)	44(83.01)	53	0.67
30-40	5 (10.63)	42(89.36)	47	

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Gestational Age				
<39	10(20.83)	38(79.16)	48	0.59
>39	4 (7.6)	48(92.3)	52	
Parity				
1	6(14.63)	35(85.36)	41	0.65
>1	8 (13.5)	51(86.4)	59	

DISCUSSION

Gestational diabetes mellitus (GDM) is a state of altered glucose metabolism that develops during pregnancy. Its severity and progression might vary. Traditionally, it has been linked to an increase in long-term issues for both the mother and her children, as well as an increase in prenatal morbidity and mortality. As comparison to macrocosmic newborns of nondiabetic moms, diabetic babies with macrosomia had more total body fat, thicker upper-extremity skin fold measurements, and smaller ratios of head to stomach circumference [6]. The placenta, amniotic fluid, gravid uterus, and the fetus account for half of the weight gained during pregnancy. Increased maternal storage of cellular water, fat, and protein is linked to the rest. Maternal fat deposition is responsible for additional weight gain. Preterm birth, caesarean section, gestational diabetes, hypertensive diseases, and infant mortality are all increased risks with higher weight gain during pregnancy. These effects would support early diagnosis and effective treatment. It is a public health issue that now has an impact on a sizable portion of the female population and has both immediate and long-term effects on the mother and the unborn child. GDM complicates more than 200,000 pregnancies worldwide every year, with a prevalence that can range from 1% to 14% of all pregnancies, depending on the population being investigated [7]. Our study comprised 100 women with gestational diabetes that had been detected during the index pregnancy and goal was to determine the frequency of macrosomia in newborns in these women. The majority patients were of age 20 to 35 years with mean age was 30.31 ± 3.5 years while this was consistent with age range of study by Jawad *et al.*, who found majority lies between 25 to 30 years of age while Bener *et al.*, observed the higher age group ranging from 35 to 45 year were most affected [8, 9]. In this study frequency of macrosomia was 14% while similar figure was also observed by Chauhan *et al.*, who reported 15%. Study by Alam *et al.*, reported very high number who enrolled 40 infants of diabetic mothers & found that macrosomia occurred in 18 babies (45%) it may because of poor controlled of diabetes and sample selection [10, 11]. It is observed in many studies that maternal hyperglycemia affectively results in to fetal hyperglycemia leads fetal hyperinsulinemia and decrease in fetal insulin reserve and insulin resistance and this proves to be main pathophysiology of underlying increase in total body weight [12,13]. Studies also shown that macrosomia neonates are more prone to develop fetal morbidity and mortality like shoulder dystocia, plexus injuries and still birth and more NICU admissions for macrocosmic neonates compared with newborns with a normal birth weight [14,15]. In our study macrosomia is more associated with younger maternal age 9(64.2%) out of 14 with age group 20-30 years and higher gestational age 10(71.42) out of 14 with gestational age >39 weeks with in insignificant p-value, this observation is in agreement with study by Okun *et al.*, and Stotland *et al.*, they also found positive association of macrosomia with younger maternal age and higher gestational age [16, 17]. Higher gestational age may be result in more weight gain. Macrosomia was more with women having history of multiparty 8(57.1%) out of 14 with a non-significant p value, while this was also in agreement with the finding of Gibson *et al.*, [18]. In comparison to a baby of normal weight, macrosomia is linked to a higher incidence of caesarean deliveries and birth canal injuries during vaginal deliveries [19]. Fetal macrosomia is more frequently associated with abnormalities of labor protraction and arrest. The majority of macrosomia-related caesarean deliveries are the result of atypical labor. Third- or fourth-degree lacerations, postpartum hemorrhage, and chorioamnionitis are all also more likely to occur with delivery of macrosomia baby [20]. There is certain limitation of our study like this study in at one hospital and we have seen frequency of macrosomia in only women having gestational diabetes, more studies are required to identify more risk factors for the macrosomia.

CONCLUSIONS

This study shows that there was a significant number of macrosomia neonates associated with women having gestational diabetes and various risk factors showing more trend in development of babies with high birth weight. As it needs early diagnosis so we suggest more studies to know more accurate number of cases so that an expert management can be done to reduce maternal and fetal morbidity and mortality.

Authors Contribution

Conceptualization: Z
Methodology: SR, ZN, MM
Formal analysis: ZN
Writing-review and editing: AK, TS, AB

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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