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Polyhydramnios, Gestational Period and Diabetes Mellitus: A Cross-Sectional Study at Khyber Teaching Hospital

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Introduction: Polyhydramnios is defined as a 4-quadrant amniotic fluid index (AFI) > 24 cm or a single maximum vertical pocket > 8 cm. Up to 2% of all pregnancies have an excess amount of fluid meeting the criteria for polyhydramnios. **Objective**: To determine the frequency of polyhydramnios in women with gestational diabetes mellitus. **Methodology**: Cross Sectional Study in the Dept. of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar. This study was conducted from 7th March 2021 to 7th September 2021. A total of 203 pregnant women with gestational diabetes mellitus were included in the study. All women underwent ultrasound before 36 weeks of gestational age and polyhydramnios was noted. **Results**: Age range in this study was from 18 to 35 years with mean age of 28.295±2.37 years, mean parity 1.167±1.14, mean gestational age 28.940±1.86 weeks and mean BMI was 26.093±1.25 Kg/m2. Polyhydramnios was seen in 10.3% patients. **Conclusion**: The majority of cases of polyhydramnios associated with gestational diabetes had a 4-quadrant AFI between 26-35.9 cm.

Keywords: Polyhydramnios; Gestation; Diabetes Mellitus; Obstetrics

INTRODUCTION

Polyhydramnios is defined as a 4-quadrant amniotic fluid index (AFI) > 24 cm or a single maximum vertical pocket > 8 cm. Up to 2% of all pregnancies have an excess amount of fluid meeting the criteria for polyhydramnios [1,2]. It is reported in the literature that approximately sixty percent of polyhydramnios is idiopathic; twenty percent of polyhydramnios can be attributed

to poorly controlled or undiagnosed diabetes and the remainder of cases of polyhydramnios are associated with foetal anomalies [2-4]. Several adverse outcomes have been associated with polyhydramnios including preterm labour and rupture of membranes.

Gestational Diabetes Mellitus (GDM) is defined as "onset or first recognition of any degree of glucose intolerance of variable severity during pregnancy" [5]. Recently in 2012, American Diabetes Association (ADA) described GDM as "diabetes diagnosed during pregnancy that is not clearly overt diabetes". GDM has health consequences not only in the short term but also in the long term for both mother and baby. Mothers with history of GDM have significantly higher risk of GDM during subsequent pregnancies and risk of type-2 diabetes and premature cardiovascular disease in the near future [6]. Whereas in the children, risk of developing obesity, diabetes, hypertension, cardiovascular disease is much higher in later life. GDM is associated with increased risk for adverse pregnancy outcomes, such as macrosomia, preterm delivery, primary caesarean delivery, shoulder dystocia, birth injury, preeclampsia, hyperbilirubinemia and foetal and neonatal mortality [7].

In a study by Sunar L, et al. has reported that frequency of polyhydramnios was 27.17% in patients with gestational diabetes mellitus [8]. In another study by Aktün HL, et al. has showed that frequency of polyhydramnios was 5% in patients with gestational diabetes mellitus as compare to 1% in non GDM pregnant women [9]. Many studies report maternal and foetal complication with GDM but were not primarily focused on polyhydramnios. [7]

Number of studies on this subject done in our country is limited. So, the present study is planned to find out the frequency of polyhydramnios in women with gestational diabetes mellitus in our local population. Results of my study will be used for further research in this subject and making future planning in patients with gestational diabetes mellitus.

MATERIAL & METHODS

Cross Sectional Study in the Dept. of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar. This study was conducted from 7th March 2021 to 7th September 2021. A total of 203 pregnant women with gestational diabetes mellitus were included in the study. All women underwent ultrasound before 36 weeks of gestational age and polyhydramnios was noted. 203 women fulfilling the inclusion criteria from Department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar were included in the study after permission from ethical committee. A detailed explanation about the participation in the study was given to the patient and an informed consent was obtained explaining the benefits of the study. Patients were evaluated and basic demographics like age, gestational age and parity were noted. All women underwent ultrasound before 36 weeks of gestational age and polyhydramnios was noted as per operational definition and recorded on specially designed proforma.

Data was analyzed with statistical analysis program (IBM-SPSS-V-22). Frequencies and percentage were computed for categorical variables like polyhydramnios. Mean ±SD was presented for quantitative variables like age, parity, gestational age and BMI. Polyhydramnios was stratified for age, gestational age, parity and BMI. Post stratification using the chi-square test was applied, $p \leq 0.05$ was considered statistically significant

RESULTS

Age range in this study was from 18 to 35 years with mean age of 28.295±2.37 years, mean parity 1.167±1.14, mean gestational age 28.940±1.86 weeks and mean BMI was 26.093±1.25 Kg/m2 as shown in Table-I. Polyhydramnios was seen in 10.3% patients as shown in Table-II.

	Demographics	Mean±SD
1	Age (years)	28.295±2.37
2	Parity	1.167±1.14
3	Gestational age (weeks)	28.940±1.86
4	BMI (Kg/m2)	26.093±1.25

Table-I: Mean±SD of patients according to age, parity, gestational age and BMI

Polyhydramnios	Frequency	%age
Yes	21	10.3%
No	182	89.7%
Total	203	100%

Table-II: Frequency and %age of patients according to Polyhydramnios

DISCUSSION

In 1970 Queenan et al [10] reported on 358 patients with clinically diagnosed polyhydramnios. Thirty-four percent was idiopathic and 24.6% was due to diabetes. This was the initial study to report the association of diabetes with polyhydramnios and is the basis for the recommendation to rule out diabetes when polyhydramnios is discovered. In 1987, Hill et al [11] reported on 102 cases

of mild to severe polyhydramnios. In 66.7% of those patients no cause was found. 14.7% % was due to either gestational or preexisting diabetes.

In our study 10.3% of polyhydramnios was associated with gestational diabetes. In a study by Sunar L, et al. has reported that frequency of polyhydramnios was 27.17% in patients with gestational diabetes mellitus [8]. In another study by Aktün HL, et al. has showed that frequency of polyhydramnios was 5% in patients with gestational diabetes mellitus as compare to 1% in non GDM pregnant women [9].

The percentage of polyhydramnios attributable to gestational diabetes is lower in our study than previously reported. The lower limit of polyhydramnios in our study was >24 cm of fluid; If the lower limit was defined as 25 cm then the amount of polyhydramnios attributable to diabetes is even lower at 2.7%. This finding was surprising because the population, has a high rate of endemic diabetes and we hypothesized that the amount would be higher than previously reported. A possible explanation is improved glycemic control during pregnancy in comparison to the 1970's when Queenan first reported this association [10].

Our goal was to evaluate gestational diabetes associated polyhydramnios. This may indicate that anomalies are more common than diabetes at extreme levels of polyhydramnios. To our knowledge no local study has looked at the quantity of polyhydramnios associated with diabetes in comparison to other causes. We found that gestational diabetes is most common in the mild range of polyhydramnios between 26 and 35.9 cm on a four-quadrant AFI. At the lower end in the 20-25.9 cm group the rate of anomalies and the rate of diabetes was the same. Interestingly, recent definitions of polyhydramnios starting at 25 cm of fluid would eliminate this group which contained 68% of all the diabetics in the study.

The formation of amniotic fluid is a complex process affected by both mother and fetus. The actual volume is determined by a steady state between input (fetal urination, exchange across the skin and alveolar exudate) and outflow (fetal swallowing and resorption through the chorioamniotic membranes whether intramembranous - to the fetus - or trans membranous - to the mother). [12] Exchange of water and solutes across the skin, however, is halted after keratinization at 24 to 26 weeks' gestation and is thus noncontributory during the third trimester. [13] Input, in turn, is affected by maternal blood flow to the placenta and the capacity for fetal maternal exchange at the intervillous space. This is modulated by maternal serum osmolality and maternal intravascular volume. [14] Most authors believe that in the third trimester fetal urination and swallowing are the two major determinants of the amniotic fluid volume. [15]

Glucose is transported across the placenta by facilitated diffusion. Part of it is used by the placenta and the fetus and the rest is excreted into the amniotic fluid, primarily through the fetal urinary tract. [16] Weirs et al. [17] demonstrated very clearly that amniotic fluid glucose profiles reflect maternal blood glucose levels.

CONCLUSION

In conclusion, the majority of cases of polyhydramnios associated with gestational diabetes had a 4-quadrant AFI between 26-35.9 cm. Cases above and below that were outliers. The rate of polyhydramnios attributable to diabetes was 10.3%. This is less than reported in previous studies.

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