

Frequency of Gestational Diabetes among Women Presenting with Premature Rupture of Membranes

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ABSTRACT

OBJECTIVE: To evaluate the frequency of gestational diabetes among women who experience premature rupture of membranes

METHODOLOGY: This descriptive cross-sectional study was conducted at the Department of Obstetrics & Gynecology, Mohammad Teaching Hospital Peshawar, from October 2021 to February 2022. One hundred fifty-five patients were selected from the Obstetrics and Gynaecology outpatient department. Women presenting with premature membrane rupture, within the reproductive age of 15-45 years, and with a gestational period beyond 37 weeks were included. Women with a history of failed inductions and those with twin pregnancies confirmed by ultrasound were excluded. A consecutive sampling of 155 females with premature rupture of membranes and screening them for gestational diabetes mellitus. The SPSS (version 22.0) was used for statistical analysis. Categorical variables, including gestational diabetes, parity, and gravidity, were summarized using frequencies and percentages. We conducted post-stratification analysis using the chi-square test, with a significance level set at $p < 0.05$.

RESULTS: The average age of the patients was 27.2 ± 5.7 years, with the majority (49.7%) falling within the age range of up to 25 years. The mean parity was 2.49 ± 1.84 . Overall, we diagnosed gestational diabetes mellitus in 24.5% of the patients.

CONCLUSION: The presence of gestational diabetes mellitus in cases of premature rupture of membranes is familiar in our population. We recommend conducting further studies to identify risk factors and develop preventive strategies before formulating recommendations for its prevention.

KEYWORDS: Diabetes Mellitus, Frequency, Gestational age, Premature birth, Premature Rupture of Membranes, Women.

INTRODUCTION

Premature membranes are rupture of membranes (amniotic sac) after 37 weeks of gestation before onset of labour. Amniotic membranes protect the fetus against anti-inflammatory, antibacterial and antiviral properties¹.

Prolonged rupture of membranes for more than 18 hours can lead to in-utero infection, harmful for both mother and fetus. It's worth noting that around 80% of females with term premature rupture of membranes (PROM) will go through unforced parturition within 24-48 hours, while a minority may have a dormant time of more than 24 hours, which increases the risk of infection².

Commencing labor induction early can help decrease the incidence of chorioamnionitis, the necessity for neonatal antibiotic treatment, and admission to the intensive care unit and improve maternal satisfaction^{3,4}. The decision to initiate labor induction is made after considering whether the fetus or the

mother would benefit from delivery⁵. Nonetheless, there is no universal management strategy for women experiencing PROM. Women can be managed conservatively to wait for the spontaneous onset of labour or actively managed through labour induction.

Gestational diabetes mellitus is a type of diabetes diagnosed for the first time during pregnancy. Gestational diabetes is a risk factor for polyhydramnios and pregnancy infection, leading causes of PROM. This study underscores the importance of recognizing infection as a critical risk factor in extreme PROM cases. It sheds light on the complexity of predicting the necessity of a caesarian section or immediate delivery in such situations⁶.

The occurrence of PROM in all pregnancies is estimated to be approximately 2-3 %, making it a notable occurrence in obstetric care⁷. Multiple risk factors are related to premature membrane rupture, particularly bacterial infection, the most prominent element. Other risk factors include race/ethnicity, pregnancy complications and uterine distension. Additionally, maternal age, 30 years and above, is considered a top risk factor for developing premature membrane rupture. Recognizing that a combination of factors likely contributes to this problem is essential. The primary maternal complication associated with premature membrane rupture is infection, with chorioamnionitis occurring in 13-60% of expectant

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mothers and postpartum infection occurring in 2-13%.⁸⁻¹⁰ It is essential to recognize that a combination of factors likely contributes to this problem

The studies do not agree on whether immediate labor induction or a waiting period before induction is preferable. Some studies suggest that expectant management for up to 48-98 hours is safe and does not increase the risk of infection, while others advocate for early intervention with equally good outcomes and no increased complications.

This study aimed to investigate the frequency of GDM in women presenting with PROM. The findings may assist healthcare professionals in enabling early screening and management of GDM, potentially improving maternal and neonatal outcomes and reducing associated complications in our population.

METHODOLOGY

A descriptive cross-sectional study was conducted in the Department of Obstetrics & Gynecology, Muhammad Teaching Hospital, from October 2021 to February 2022. The approval for this study was taken from the institutional review board. One hundred and fifty-five patients were selected from the outpatient department of Obstetrics and Gynecology using a non-probability consecutive sampling technique, a confidence level of 95% and a margin of error of 5%, based on an anticipated population proportion of 11.38%, as calculated using the WHO calculator.

Inclusion criteria encompassed women presenting with PROM, diagnosed with a history of per vaginal gush of fluid and by per speculum examination, within the reproductive age of 15-45 years, and with a gestational period beyond 37 weeks. Women with diagnosed gestational diabetes were included based on an oral glucose tolerance test. Exclusions were made for women with a history of failed inductions and those with twin pregnancies confirmed by ultrasound. These exclusions were made to prevent potential bias in the study results. Women with a history of vaginal infection were also inquired.

Patients were informed of the study's purpose and benefits to ensure transparency and ethical conduct. They were assured that their participation was solely for data publication and research purposes, with confidentiality maintained throughout. Written informed consent was obtained from all participating patients.

Every female underwent a comprehensive history-taking process and a detailed physical and gynaecological examination to identify and exclude potential confounders that could introduce bias into the study results. Relevant information, such as name, age, parity, gravida, and address, was recorded in a pre-designed proforma. Data were subsequently stored and analyzed using SPSS version 22.

Quantitative variables, like gestational age, were summarized as Mean±SD, while categorical variables, such as gestational diabetes, parity and gravidity, were summarized using frequencies and percentages.

Gestational diabetes was stratified based on gestational age, parity and gravidity. Post-stratification analysis was performed using the Chi-square test, with a significance level set at $p < 0.05$.

RESULTS

The research study was conducted with a cohort of 155 female participants who presented with premature rupture of membranes (PROM). The mean age of the participants was 27.2±5 years, with an age range spanning from 19.5 years as the youngest to 37.5 years as the oldest. When categorizing the participants into different age groups, it was observed that 49.7% fell within the age group up to 25.00 years, 11% were in the age group ranging from 25.01 to 30.00 years, 28.4% were within the age range of 30.01 to 35.00 years, and 11% were above 35.00 years (Table I).

Comprehensive obstetric history assessments were conducted for all participants in the study. The mean parity among the patients was 2.49±1.8. Specifically, 9% of participants were classified as primiparous (parity 0), 82.6% were categorized as multiparous (Parity 1-5), and 8.4% were designated as grand multiparous (Parity more than 5) (Table II).

The frequency of gestational diabetes mellitus among women presenting with PROM was documented in 38 (24.5%) patients.

Further stratification of PROM cases was performed based on age groups and parity. Upon applying the chi-square test, it was observed that there was a statistically significant difference concerning age, with a p-value of < 0.001 , as well as parity, with a p-value of < 0.001 (Table III and IV).

Table I: Age-wise distribution of sample (n=155)

	n	Minimum	Maximum	Mean	Std. Deviation
Age of the patient	155	19.50	37.50	27.1845	5.74775
Age Groups			Frequency	Percent	
up to 25.00 years			77	49.7	
25.01 to 30.00 years			17	11.0	
30.01 to 35.00			44	28.4	
35.01 years & above			17	11.0	
Total			155	100.0	

Table II: Parity of the sample (n=155)

	n	Minimum	Maximum	Mean	Std. Deviation
Parity of the patient	155	.00	6.00	2.4968	1.81399
Parity Groups			Frequency	Percent	
Primiparous			14	9.0	
Multipara			128	82.6	
Grand Multipara			13	8.4	
Total			155	100.0	

Table III: Age-wise distribution of GDM (n=155)

Age Groups	Gestational DM		P-Value
	Yes	No	
up to 25.00 years	8 10.4%	69 89.6%	< 0.001
25.01 to 30.00 years	0 0.0%	17 100.0%	
30.01 to 35.00	30 68.2%	14 31.8%	
35.01 years & above	0 0.0%	17 100.0%	
Total	38 24.5%	117 75.5%	

Table IV: Parity-wise stratification of GDM (n=155)

Parity Groups	Gestational DM		P-Value
	Yes	No	
Primiparous	0 0.0%	14 100.0%	< 0.001
Multipara	25 19.5%	103 80.5%	
Grand Multipara	13 100.0%	0 0.0%	
Total	38 24.5%	117 75.5%	

DISCUSSION

Over the past years, a noteworthy reduction in fetal and newborn children losses was observed in pregnancies complicated by diabetes^{11,12}. Findings from the Second International Workshop-Conference on Gestational Diabetes Mellitus underscored the increased risk of various neonatal complications associated with infants born to mothers with GDM¹³. These complications have been reported to affect up to 25% of such infants. Detecting GDM early and maintaining strict metabolic control during pregnancy is essential to reduce the frequency and severity of these newborn difficulties¹⁴.

The prevalence of GDM exhibits global variations and varies among different racial groups, with higher rates among Blacks, Latinos, and Asian females compared to white females¹⁵. Research conducted in the Kashmir region found that females reported a GDM prevalence of 3.8%.¹⁶ The increasing prevalence of diabetes mellitus globally has raised concerns.

Another study found that pregnant females with GDM had an elevated likelihood of experiencing hydramnios and preterm deliveries in the delayed screening group. Notably, all instances of PROM and abnormalities in developing children fetal anomalies occurred in the delayed screening group. The

possibility of preventing certain complications in women with gestational diabetes through early glucose tolerance screening is suggested; however, more studies are required to find whether this should be applied universally or selectively among high-risk individuals¹⁷⁻¹⁸.

Another study found no significant rise in the risk of preterm labor and PROM despite the higher risk of polyhydramnios. While insulin treatment was administered, macrosomia still occurred in GDM patients, albeit without shoulder dystocia, as there was a notable increase in cesarean sections. The Impaired Glucose Tolerance group did not exhibit adverse fetal or maternal outcomes, but there was a higher rate of interventions and CS¹⁹⁻²⁰.

In a separate study, it was revealed that females diagnosed with GDM faced an elevated risk of maternal complications, including preeclampsia (7.3%), preterm labor (19.8%), PROM (15.3%), and CS (27.9%), compared to women with normal glucose tolerance.²⁴ The same findings have been documented in prior research^{25,26}. Preeclampsia (17.9%) and CS (17.1%) were more common among females with GDM than those with normal glucose levels. These results align with the experiences of GDM patients in China²¹.

Unlike pre-gestational diabetes, gestational diabetes has not been definitively established as an independent risk factor for congenital disabilities. Congenital disabilities typically occur during the first trimester of pregnancy (before the 13th week), while GDM naturally becomes more pronounced in the later stages. Some research has suggested a potentially elevated risk of congenital malformations in the offspring of women with GDM²⁰. Comprehensive case-control research indicated a link between gestational diabetes and a specific group of congenital disabilities, with the association being more pronounced in females with a higher body mass index ($\geq 25 \text{ kg/m}^2$)¹⁹. It is important to note that these findings may be influenced by the incorporation of females with pre-existing type 2 diabetes who were not diagnosed before pregnancy.

This research highlighted the frequency of GDM among females experiencing PROM in our population. As indicated in the literature, the possibility of GDM rises progressively with maternal BMI, with obesity emerging as a significant risk factor for the development of GDM. Additionally, Babies born to mothers with GDM also face an elevated risk of macrosomia, congenital anomalies, and birth injuries. The study's strengths were that it addressed a significant and clinically relevant topic by exploring the frequency of gestational diabetes (GDM) in women with premature rupture of membranes (PROM), providing valuable insights into the intersection of these two conditions. Second, it filled the gap in the literature by providing new information and contributing to the overall understanding of maternal health.

The limitations were that the study was conducted in a single health centre, the sample size was small, and the findings may not be generalized to other populations or settings.

CONCLUSION

Our findings emphasize the occurrence of GDM in pregnancies complicated by PROM within our population. We advocate for further research to identify risk factors and develop preventive strategies before establishing comprehensive recommendations for GDM prevention.

Ethical Permission: Muhammad College of Medicine, Peshawar IRB letter No. MCM/IRB/2021-145

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AUTHOR'S CONTRIBUTION

Robeen K: Conception and Design of study, Data Collection, Analysis and Interpretation, Drafting and writing the manuscript and responsible for research integrity.

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