Section: Obstetrics & Gynaecology

Original Research Article

DIABETES AND PERINATAL OUTCOMES AMONG TEENAGE PREGNANCIES OF 18 TO 19 YEARS AND ABOVE 19 YEARS PRIMIGRAVIDA: A COMPARATIVE CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Objective: The study aimed to determine the relationship between gestational diabetes mellitus (GDM), preterm delivery, appearance, pulse, grimace, activity, and respiration (APGAR) score, meconium-stained amniotic fluid (MSAF), low birth weight (LBW), intrauterine fetal demise (IUFD), and neonatal intensive care unit (NICU) admission, among mothers aged 18 to 19 years and mothers over 19 years.

Material and Methods: This hospital-based cross-sectional study encompassed 300 (18-19-year-old) adolescent mothers in Group 1. In Group 2, 600 gestationally matched pregnant women (20-30 years) participated. Preterm birth and 75g oral glucose tolerance, LBW, APGAR score ≤7, NICU admission, IUFD, and MSAF were collected. Chi-square and Student t-tests were employed in SPSS at a 5% significance level.

Results: The mean age of groups 1 and 2 was 18.64±0.27 years and 24.13±2.04 years, respectively (p<0.0001). The GDM frequency was greater in group 1 (11%) than group 2 (3.5%) (p<0.0001). The frequency of preterm delivery was greater in adolescent women (27%) compared to young adults (19%) (p=0.1). The average birth weight of babies from groups 1 and 2 was 2344±247 and 2843±283 grams, respectively (p<0.0001). Teenage mothers had more LBW babies than older mothers (p=0.18). Pregnant adolescents had 5.33% IUFD, compared to 1.17% in group 2 (p=0.000). The NICU transfer rate was higher for group 1 (8.97% vs. 4.67%) (p=0.02). The APGAR score and MSAF were negligible between the groups.

Conclusion: Preterm delivery, LBW, GDM, NICU hospitalization, low APGAR score, and IUFD were most common in Group 1, except for MASF frequency, which was higher in Group 2.

Keywords: APGAR, Gestational Diabetes, low birth weight, Teenage pregnancy, Meconium.

INTRODUCTION

Teenage pregnancy refers to pregnancy occurring following menarche and up to the age of 19 years.[1] In developing countries, pregnant women tend to be younger on average than those in Western nations, with 11% of all births attributed to teenage mothers, 90% of which occur in developing countries.[2,3] Since maternal and newborn fatalities are the most potent markers of healthcare in a nation, adolescent mothers should be the reference population for the development of successful healthcare initiatives because of the higher documented death rate of 25% in this group.[4] Henceforth, teenage pregnancy represents a significant public health issue in both developed and developing nations, characterized as a 'high-risk' or 'at-risk' pregnancy due to its correlation with numerous adverse maternal and fetal outcomes.[5]

The diagnosis of Gestational Diabetes Mellitus (GDM) has historically relied on the identification of hyperglycemia occurring during pregnancy. Currently, the American Diabetes Association defines GDM as diabetes diagnosed during the

second or third trimester of pregnancy that was not present before gestation, nor does it include other forms of diabetes that may occur during pregnancy.[6,7] Additionally, there is a heightened occurrence of preterm deliveries among teenage girls, which is linked to various complications in newborns, including a higher prevalence of hyaline membrane disease, prematurity, neonatal hypoglycemia, hyperbilirubinemia, and the necessity for admissions to neonatal intensive care units.[1,8]

The prevalence of low birth weight (LBW), shoulder dystocia, appearance, pulse, grimace, activity, and respiration (APGAR) score below 7 at 5 minutes, hypoxic-ischemic encephalopathy, respiratory distress, neonatal sepsis, meningitis, and neonatal seizures is higher in newborns of teenage mothers in comparison to those of adult females.[1] Perinatal mortality is elevated in women with meconium-stained amniotic fluid (MSAF), including those at low risk for obstetric complications.[9] Thus, we aimed to determine the relationship between GDM, preterm delivery, and adverse neonatal outcomes, including APGAR score, meconium-stained amniotic fluid (MSAF), LBW, intrauterine fetal demise (IUFD), and neonatal intensive care unit (NICU) admission, among mothers aged 18 to 19 years, in comparison to mothers over 19 years of age.

MATERIALS AND METHODS

This hospital-based cross-sectional retrospective study was conducted for 10 months involving 900 pregnant women who attended the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital in GMCM, North Kerala, starting in October 2023. Group 1 consisted of 300 female adolescents aged 18 to 19 years. Group 2 comprised 600 gestationally matched pregnant women aged 20 to 30 years, all of whom delivered at the same medical facility during the same period. Thus, the present study included 900 pregnant mothers. Participants were chosen through a systematic random sampling method. The objective of the investigation was communicated to the participants, and informed consent was obtained from each individual. The maternal and neonatal outcomes of pregnancy were contrasted between the two groups. Approval from the Institutional Ethics Review Committee was secured before the commencement of data collection [IEC/GMCM/117 dated 29/9/2023].

Based on the assumption that 17% of the population possesses the factor of interest (GDM), as indicated by a prior study,[10] a sample size of 217 was necessary to estimate the expected proportion with an absolute precision of 5% and a confidence level of 95%.

In a 1:2 study design, 300 samples were assigned to Group 1, while 600 adult pregnancies were assigned to Group 2. The inclusion criteria comprised pregnant women within specified age groups who delivered at GMCM in 2023.

Group 1: Pregnant women aged 18 to 19 years.

Group 2 consists of pregnant mothers aged 20 to 30 years.

Pregnant women were excluded if they had: multiple pregnancies, fetal loss before 22 weeks of gestation, stillbirth, lack of follow-up before data collection during pregnancy or the neonatal period, profound maternal or fetal comorbidities not associated with GDM status during pregnancy or the perinatal period, and pre-pregnancy diabetes mellitus. We eliminated instances with antepartum stillbirth, chromosomal aberrations, and substantial fetal malformations because these conditions might alter labour and delivery treatment and are typically linked to poorer neonatal outcomes. Pregnant females who had previously participated in this study were excluded from consecutive visits, as they received a tag on their maternal child healthcare card, which was verified at every visit.

Data collection, encompassing sociodemographic profiles and pregnancy status, was conducted using a pretested forms accessible via Google Forms. Maternal outcomes encompassed the administration of the 75g oral glucose tolerance test during the second trimester (24–28 weeks of gestation). Preterm delivery was categorized as occurring before 37 weeks, 34 weeks, and 28 weeks of gestation. Women were classified according to maternal age at delivery into two groups: young adolescents (aged 18–19 years) and young adults (aged 19.1–30 years). Neonatal outcomes consisted of LBW (<2500 g), very LBW (<1500 g), APGAR score at 5 minutes ≤7, admission to the NICU, IUFD, and MSAF.

Statistical Analysis

The data was uploaded into Microsoft Excel and subsequently entered into SPSS Statistics for Windows, Version 25.0 (SPSS Inc., Chicago). The Chi-Square and Student's t-tests were used to confirm the findings of the group analysis. A p-value below 0.05 indicates a statistically significant difference.

RESULTS

The study comprised 300 young adolescent mothers, representing 33.33% of the sample, aged 18 to 19 in group 1. Group 2 comprised 600 young mothers aged between 19.1 and 30 years. The study revealed that 53.78% of the sample had primary education or less, while 46.22% had attained secondary education or higher. A significant portion of the study sample, 85.44%, was below the poverty line, while 14.56% surpassed it. The sociodemographic details are presented in Table 1.

The mean age of the sample was 21.39±1.16 years, with groups 1 and 2 having mean ages of 18.64±0.27 years and 24.13±2.04 years, respectively. The mean age difference between the groups was statistically significant ($p<0.0001$). The prevalence of GDM was observed to be greater in group 1 (11%) in comparison with group 2 (3.5%), with the difference being statistically significant ($p<0.0001$). The study indicated that the prevalence of preterm delivery

before 37 weeks of gestation was higher in adolescent mothers (27%) compared to young adults (19%). The frequency of preterm birth at <34 weeks and <28 weeks in group 1 was 5.67% and 0.67%, respectively, while in group 2, it was 4% and 0.5%, respectively. [Table 2] The difference in frequencies of preterm birth between the groups was statistically insignificant (p=0.1).

Table 3 presents the perinatal outcomes of the newborns. The mean birth weight of newborns from adolescent and young mothers was 2344±247 grams and 2843±283 grams, respectively (p<0.0001). Infants born to teenage mothers exhibited a notably elevated frequency of LBW (<2500 g: 23.67%, <1500 g: 7%) compared to those born to adult women (<2500 g: 15.5%, <1500 g: 2.83%). The variation was not statistically significant (p=0.18). In our investigation, the prevalence of IUFD among pregnant adolescents was 5.33%, significantly higher than the 1.17% observed in their counterparts (p=0.000).

Transfer to the NICU occurred more frequently among newborns of adolescent mothers (8.97% compared to 4.67%), with a statistically significant difference observed (p=0.02). Our findings indicated that 6% of children born to teenage mothers had an APGAR score of ≤7 at 5 minutes, indicative of birth asphyxia, compared to 4.83% among children of young adults. The variations in APGAR scores were statistically insignificant (p=0.46). Groups 1 and 2 had MSAF frequencies of 4.67% and 6.83%, respectively, with a statistically insignificant difference (p=0.2). [Table 3]

Table 1: Sociodemographic profile of the study sample

Variables	N(%)
Age	21.39±1.16
Group 1 (18-19 years)	300 (33.33)
Group 2 (>19 years)	600 (66.67)
Primary education and below	484 (53.78)
Secondary education and above	416 (46.22)
Below poverty line	769 (85.44)
Above poverty line	131 (14.56)

Table 2: Comparison of maternal complications evaluated in the study

	Group 1 n (%)	Group 2 n (%)	λ^2	p-value
Mean age[ŧ]	18.64±0.27	24.13±2.04	-46.4	<0.0001**
Gestational diabetes	33 (11)	21 (3.5)	19.19	0.000**
Preterm delivery				
<37 weeks	81 (27)	114 (19)	0.005	0.1
<34 weeks	17 (5.67)	24 (4)		
<28 weeks	2 (0.67)	3 (0.5)		

[ŧ]-t-test; **-highly significant; p>0.05-insignificant

Table 3: Comparison of perinatal outcome of the newborns evaluated in the study

	Group 1 n (%)	Group 2 n (%)	λ^2	p-value
Birth weight (g)				
Mean±SD[ŧ]	2344±247	2843±283	-25.99	<0.0001**
<2500	71 (23.67)	93 (15.5)	1.78	0.18
<1500	21 (7)	17 (2.83)		
NICU admission	26 (8.97)	28 (4.67)	5.67	0.02*
Intrauterine fetal demise	16 (5.33)	7 (1.17)	13.94	0.000**
APGAR score at 5 minutes ≤7	18 (6)	29 (4.83)	0.55	0.46
MSAF	14 (4.67)	41 (6.83)	1.64	0.2

[ŧ]-t-test; **-highly significant; *-significant; p>0.05-insignificant

DISCUSSIONS

Pregnant teenagers experienced considerably higher rates of GDM, LBW, IUFD, and NICU admission compared to young adults. Pregnancy among adolescents is well recognized as a high-risk condition, presenting specific threats to both the mother and the newborn. The study determined the extent of teenage pregnancies and to determine the differences in maternal and newborn outcomes between teenagers aged 18-19 years and younger adult mothers aged 19-30 years. This study aimed to eliminate confounding factors that may contribute to adverse pregnancy outcomes in pregnant adolescents. The families of all women provided financial support and they were legally married. They were neither smokers nor drug addicts and abstained from consuming alcohol. All participants were primigravidas who commenced the trial after 20 weeks of gestation, with no history of bleeding during the first trimester. The BMI was determined to be within the average range, leading to the exclusion of maternal weight implications, which was in line with the findings of a comparable study.[11]

Our study corroborates the findings of several investigations on teenage pregnancies conducted in

India, indicating that maternal and fetal outcomes are threatened within this population group.[10,12-14] In contrast, Masoumi et al.[11] indicated that pregnancy outcomes were superior in the 15 to 19 age group in comparison with the 20 to 35 age group. A study conducted on the Omani community indicated that there were no adverse pregnancy outcomes in both the early and late teenage cohorts.[15] Conversely, another study conducted in Oman[16] indicated elevated rates of preterm births, early rupture of membranes, anemia, and LBW among pregnant teenagers aged 14 to 19 years when compared to the 20 to 25 years of age cohort. The frequency of documented adverse maternal and fetal outcomes is therefore inconsistent across the various study populations.

Due to elevated perinatal morbidity and mortality rates, adolescent women require comprehensive antenatal, and postnatal care. Efforts to avert pregnancy among teenagers must encompass the distribution of contraception, comprehensive sex education, initiatives to foster a more appropriate perspective on pregnancy, and measures to enhance the social milieu.[17] While GDM is a prevalent condition globally and is associated with negative neonatal outcomes, the findings of this study cannot be universally applied to diverse populations considering factors such as ethnic background, socioeconomic parity, preferred method of delivery, and various other variables affecting the outcomes. The results we have reported are crucial for stimulating new research and conversations about the detection, diagnosis, and management of GDM.[6] It is crucial to underscore the renewed focus on early GDM diagnosis to avert neonatal morbidity and mortality and to recognize prospective long-term mother complications. The findings of the present study emphasize the significance of the issue that GDM is a pivotal element in mitigating unfavourable consequences. Furthermore, prompt detection of diabetes risk following childbirth is crucial and can be achieved with rapid postpartum blood sugar tests.[18] Comprehensive postpartum screening for diabetes among those with GDM is routinely advised at and after 6 weeks postpartum.[7,18,19]

The current study demonstrated a greater prevalence of LBW newborns (<2500g) among adolescent primigravidae (23.67%) compared to older mothers (15.5%). Comparable findings were demonstrated in other investigations, such as Dutta et al.[20] at 25%, Rashmi et al.[21] at 26.9%, and Gazala et al.[22] at 27.4%. Newborns of adolescent mothers were seen to have a higher likelihood of LBW and an increased necessity for resuscitation interventions. Pregnant teenage females must be delivered at a healthcare facility equipped with NICU services.[1] Additionally, MSAF poses a risk to infant life unless strategies such as vigilant labour monitoring and prompt interventions, including emergency caesarean section, competent neonatal resuscitation, NICU services, and prudent management, are implemented to preserve life. Further, low APGAR scores at one and five minutes were correlated with thick meconium.[23] It was linked to fetal discomfort and maternal hypertension disorders during pregnancy.[24] Dereje et al.[9] reported that women in late-term pregnancy had an 8.8-fold heightened risk of MSAF as opposed to those in early-term pregnancy. This may be attributed to the maturation of the gastrointestinal tract and heightened secretion of motilin by the fetus as gestational age progresses, resulting in enhanced fetal bowel peristalsis and the subsequent passing of meconium.[9]

Consistent with our study results, Ogawa et al.[25] and Diabelkova et al.[26] documented that low APGAR scores were substantially more prevalent among teenage mothers compared to young mothers who were 20 years and older. Low APGAR scores are also linked to consequences for infants, including hypothermia, convulsions, feeding issues, respiratory problems,[27] increased mortality, and a heightened risk of cerebral palsy.[28] Straube et al.[29] found that maternal age and parity had a significant impact on APGAR scores, which contrasts with the results of our study. They found that older women over 35 years were more likely to have low APGAR scores than women between the ages of 20 and 35. The notable age-related differences in newborn outcomes among mothers identified in this study may be utilized to define the at-risk groups requiring targeted support and interventions to mitigate the likelihood of adverse outcomes for these populations. It is imperative to draw attention to the necessity of comprehensive prenatal assistance for pregnant teenagers, as inadequate prenatal care can adversely affect both the mother and her fetus. Advocating early and comprehensive prenatal care is essential for enhancing the outcomes of adolescent pregnancies. Families, healthcare providers, educational institutions, community-based organizations, and legislators must make a significant effort to address this issue.[26]

The primary strength of the present investigation is its extensive cohort with health information, facilitating the examination of a diverse range of outcomes. Nonetheless, as the sample frame is derived from the healthcare facility, it does not constitute a representative sample of the community. It represents the population that seeks institutionalized delivery. The retrospective design of the investigation and the diversity in definitions for newborn and maternal health outcomes could have affected the study results.

CONCLUSION

Adolescent pregnancies are significant contributors to maternal and perinatal mortality and morbidity. Preterm delivery, LBW, GDM, NICU hospitalization, low APGAR score, and IUFD were most common in Group 1, except for MASF frequency, which was higher in Group 2. Risk factor identification may aid in prompt diagnosis and

therapies that lower morbidity and mortality rates among mothers and newborns.

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