

Original Research Article

# PERINATAL OUTCOME OF TERM PREGNANCIES COMPLICATED BY POLYHYDRAMNIOS: A RETROSPECTIVE OBSERVATIONAL STUDY OF 40 CASES

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Received : 04/07/2026  
Received in revised form : 04/08/2026  
Accepted : 18/08/2026

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DOI: 10.70034/ijmedph.2026.3.888

Source of Support: Nil,  
Conflict of Interest: None declared

**Int J Med Pub Health**  
2026; 16 (3); 5765-5771

## ABSTRACT

**Background:** Polyhydramnios, defined as an amniotic fluid index (AFI) of 25 cm or more, complicates 0.2–3.9% of pregnancies and is associated with increased maternal and perinatal morbidity. Data from Indian tertiary care centres on the full spectrum of outcomes in term pregnancies with polyhydramnios remain limited. The objective is to evaluate the aetiology, degree of polyhydramnios, mode of delivery, maternal complications, and perinatal outcomes in term pregnancies complicated by polyhydramnios at a tertiary care centre.

**Materials and Methods:** This retrospective observational study reviewed the case records of 40 consecutive term pregnancies (gestational age  $\geq 37$  weeks) with polyhydramnios (AFI  $\geq 25$  cm) delivered at a tertiary care centre. Aetiology, AFI severity, mode of delivery, complications, and perinatal outcomes were extracted from hospital records. Associations were assessed by Fisher's exact test ( $p < 0.05$  = significant).

**Results:** Mean maternal age was  $26.4 \pm 4.8$  years; 45% were primigravidae. Idiopathic polyhydramnios was the most common cause (55%), followed by gestational diabetes mellitus (20%) and fetal anomaly (12.5%). Mild polyhydramnios (AFI 25–29.9 cm) was present in 55% of cases, moderate (30–34.9 cm) in 32.5%, and severe ( $\geq 35$  cm) in 12.5%. Lower segment caesarean section was performed in 50% of cases overall, rising from 31.8% in mild to 100% in severe cases ( $p = 0.027$ ). Premature rupture of membranes was the most common maternal complication (20%). NICU admission was required in 22.5% of neonates and rose significantly with AFI severity ( $p = 0.027$ ). Perinatal mortality was 7.5% ( $n = 3$ ). Adverse perinatal outcome occurred in 27.5% of cases overall and was strongly associated with AFI severity (9.1% mild vs 80.0% severe;  $p = 0.003$ ).

**Conclusion:** Polyhydramnios at term carries substantial maternal and perinatal risk. AFI severity predicts mode of delivery and adverse perinatal outcome. Delivery at a tertiary care centre with neonatal intensive care facilities is essential.

**Keywords:** Polyhydramnios; amniotic fluid index; perinatal outcome; term pregnancy; caesarean section; NICU admission.

## INTRODUCTION

Polyhydramnios refers to an excess of amniotic fluid in the amniotic sac, defined as an amniotic fluid index (AFI) of 25 cm or more, or a single deepest pocket (SDP) exceeding 8 cm on real-time obstetric

ultrasound.<sup>[1]</sup> The condition affects an estimated 0.2–3.9% of all pregnancies, with variation in reported frequency attributable to differences in diagnostic criteria, gestational age at assessment, and characteristics of the study population.<sup>[1]</sup> Although polyhydramnios may arise at any gestational age, it

carries its greatest clinical consequences when it persists into the third trimester and is present at term, where it creates a distinct set of maternal and perinatal risks.

Amniotic fluid volume is maintained by a dynamic equilibrium between production and reabsorption. From mid-gestation onwards, fetal urine output is the dominant source of amniotic fluid, with lung liquid secretion contributing a smaller fraction. The primary route of clearance is fetal swallowing, with intramembranous absorption across the fetal membranes serving as a secondary pathway.<sup>[2]</sup> Any condition that impairs fetal swallowing, increases fetal urinary output, or reduces membrane absorption can disturb this equilibrium and result in fluid accumulation. Gastrointestinal obstructions such as oesophageal or duodenal atresia, and central nervous system lesions that impair the swallowing reflex, are common structural causes. In gestational diabetes mellitus, fetal hyperglycaemia drives an osmotic diuresis that increases urinary output into the amniotic compartment.

Aetiology is broadly classified as idiopathic or secondary. Idiopathic polyhydramnios — where no underlying cause is identified after thorough evaluation — accounts for 60–70% of all cases and is most frequent in the mild to moderate severity range.<sup>2</sup> Secondary causes include fetal structural anomalies (particularly gastrointestinal atresias, diaphragmatic hernia, and neural tube defects), chromosomal anomalies, gestational diabetes mellitus, maternal Rh isoimmunisation, twin-to-twin transfusion syndrome, and fetal hydrops from infectious causes including cytomegalovirus and toxoplasmosis. In a large birth series of 225,669 consecutive deliveries, congenital malformations were found in approximately one quarter of pregnancies with polyhydramnios, highlighting the importance of a systematic anomaly evaluation at the time of diagnosis.<sup>[3]</sup>

Severity grading by AFI carries independent prognostic value. Polyhydramnios is classified as mild (AFI 25–29.9 cm), moderate (AFI 30–34.9 cm), or severe (AFI  $\geq 35$  cm).<sup>[4]</sup> The maximal AFI has been shown to be an independent predictor of perinatal outcome, with congenital anomalies, preterm delivery, and perinatal mortality each increasing in frequency as AFI rises.<sup>4</sup> The stepwise relationship between AFI level and congenital anomaly prevalence has been confirmed in subsequent studies, reinforcing the clinical value of severity classification at the time of initial diagnosis.<sup>[5]</sup>

The maternal consequences of polyhydramnios arise primarily from uterine overdistension. Risks include preterm labour, premature rupture of membranes, malpresentation, cord prolapse at membrane rupture, dysfunctional labour, placental abruption, and postpartum haemorrhage from uterine atony. Severe dyspnoea and abdominal discomfort may develop from diaphragmatic splinting, occasionally necessitating intervention before term. An unstable fetal lie in the setting of excess fluid creates the

additional danger of acute cord prolapse when membranes rupture suddenly, requiring immediate operative delivery. The rate of caesarean section is therefore elevated both because of malpresentation and because of unpredictable intrapartum complications.<sup>[1]</sup>

Fetal and neonatal risks are substantial. Cord compression and prolapse contribute to acute intrapartum asphyxia. Neonates born in the context of polyhydramnios have higher rates of low Apgar scores, respiratory distress, and admission to neonatal intensive care units. Perinatal mortality is greater than in unaffected pregnancies, particularly in cases of severe polyhydramnios or those complicated by underlying fetal anomaly.<sup>[2]</sup>

Management is individualised and depends on severity, aetiology, and gestational age. Mild cases can be managed conservatively. Therapeutic amnioreduction is reserved for symptomatic or severe cases. When gestational diabetes is identified, optimisation of glycaemic control can reduce amniotic fluid volume. Delivery planning must account for fetal presentation, the risk of cord prolapse at membrane rupture, and anticipated neonatal requirements.

Data from Indian tertiary care settings on the full spectrum of maternal and perinatal outcomes in term pregnancies with polyhydramnios remain limited. The prevalence of gestational diabetes is rising across the country, Rh isoimmunisation continues to contribute in some settings, and a proportion of women present without prior aetiological evaluation. This retrospective observational study was undertaken to describe the aetiology, AFI severity distribution, mode of delivery, maternal complications, and perinatal outcomes in 40 consecutive term pregnancies with polyhydramnios managed at a tertiary care centre, with the aim of informing local clinical decision-making.

## MATERIALS AND METHODS

This was a retrospective observational study conducted in the Department of Obstetrics and Gynaecology of a tertiary care medical institute. Patient identifiers were removed at the time of data extraction and all data were handled in a de-identified manner. No formal sample size calculation was performed; all case records fulfilling the predefined inclusion and exclusion criteria during the study period were included consecutively, yielding a total of 40 cases. The study population consisted of women with term pregnancies of  $\geq 37$  completed weeks complicated by polyhydramnios documented on ultrasonography. Data were collected retrospectively from the available IPD case papers, investigation records, labour records, delivery records and neonatal records for the study period.

Demographic and baseline obstetric information available in the records was documented, including maternal age, residence, socioeconomic details,

height, weight and body mass index wherever recorded. Obstetric characteristics including gravidity, parity, gestational age at admission and booking status were noted. Gestational age documented in the case records on the basis of the last menstrual period and/or available ultrasonographic examination was considered for the study.

Detailed obstetric and medical histories documented in the IPD records were reviewed. Information regarding presenting complaints such as excessive abdominal distension, abdominal discomfort, breathlessness, uterine contractions, leaking per vaginum, bleeding per vaginum and perception of fetal movements was recorded wherever available. Previous obstetric history was also noted. Information regarding previous blood transfusions, Rh isoimmunization, medications and other relevant risk factors was also recorded wherever available.

Findings of the general, systemic and obstetric examinations documented at the time of admission and during hospitalization were retrieved from the IPD case papers. Clinical findings suggestive of an overdistended uterus and other features associated with polyhydramnios were recorded wherever available. Findings of pelvic examination during labour, including cervical dilatation and effacement, status of membranes, presenting part and progress of labour, were also extracted from the available records.

Available laboratory and ultrasonographic investigation reports were reviewed. Relevant investigations including complete blood count, blood group and Rh typing, urine examination, blood glucose assessment and other investigations performed during admission were documented. Ultrasonographic records were reviewed for gestational age, fetal viability, fetal presentation, placental location, estimated fetal weight, fetal anatomy and amniotic fluid volume. The documented amniotic fluid index was recorded. Associated fetal anomalies, if documented, were also noted. Available fetal surveillance records, including non-stress test/cardiocography and Doppler findings, were reviewed. Labour and delivery records were examined for onset of labour, induction or augmentation of labour, rupture of membranes, fetal heart rate abnormalities, mode of delivery and intrapartum complications. Neonatal records were reviewed for birth weight, sex, Apgar scores, requirement for resuscitation, congenital anomalies, NICU admission, duration of NICU stay, neonatal morbidity, stillbirth and neonatal death documented during hospitalization.

Data extracted from the case records were entered into a Microsoft Excel spreadsheet and analysed using SPSS version 23.0 (IBM Corp., Armonk, NY, USA). Continuous variables such as maternal age,

gestational age, amniotic fluid index and birth weight were expressed as mean  $\pm$  standard deviation, and categorical variables such as parity, aetiology, mode of delivery, maternal complications and perinatal outcomes were expressed as frequencies and percentages. Cases were stratified into mild, moderate and severe categories on the basis of the documented amniotic fluid index, and the association between AFI severity and mode of delivery, maternal complications and perinatal outcomes was assessed using Fisher's exact test, which was preferred to the chi-square test in view of the small expected cell frequencies. Adverse perinatal outcome was analysed as a composite of NICU admission, stillbirth and early neonatal death. A p value of less than 0.05 was considered statistically significant

#### **Inclusion Criteria**

1. IPD case records of women with term pregnancies complicated by polyhydramnios who had been admitted and delivered during study period were included.
2. Women who were aged 18 years or above at the time of admission were included.
3. Women with term pregnancies of  $\geq 37$  completed weeks of gestation were included.
4. Women with singleton or multiple pregnancies with polyhydramnios documented on ultrasonography were included.
5. Cases in which IPD, delivery and neonatal records containing the required information for assessment of perinatal outcomes were available were included.

#### **Exclusion Criteria**

1. Records of women who were aged below 18 years at the time of admission were excluded.
2. Records with insufficient or incomplete information required for assessment of the study outcomes were excluded.
3. Pregnancies with gestational age of less than 37 completed weeks were excluded.
4. Cases in which polyhydramnios had not been documented or adequately supported by the available ultrasonographic records were excluded.
5. Cases in which delivery or essential neonatal outcome records were unavailable were excluded.

## **RESULTS**

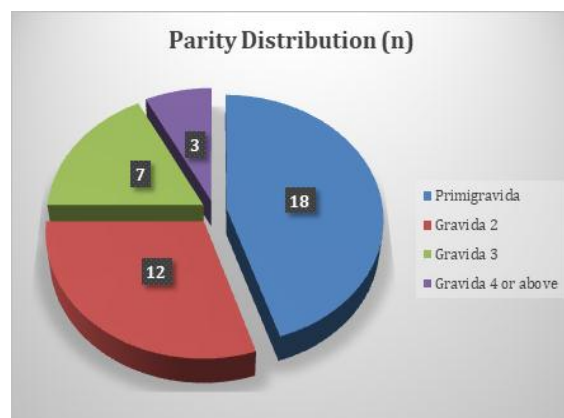
A total of 40 term pregnancies complicated by polyhydramnios were included over the study period. The majority of mothers were in the 23–27 year age group and the mean age of studied cases was found to be  $26.4 \pm 4.8$  years. [Table 1].

**Table 1: Age distribution of mothers in the study population (n = 40).**

| Age Group (years) | Number (n) | Percentage (%) |
|-------------------|------------|----------------|
| 18–22             | 8          | 20.0           |
| 23–27             | 15         | 37.5           |
| 28–32             | 12         | 30.0           |
| 33 or above       | 5          | 12.5           |
| Total             | 40         | 100            |

The analysis of the parity distribution of the studied cases showed that primigravida was the most common category, comprising 18 (45.0%) cases, followed by gravida 2 with 12 (30.0%) cases, gravida 3 with 7 (17.5%) cases, and gravida 4 or above with 3 (7.5%) cases. Overall, a total of 40 (100%) cases were included in the study [Figure 1].

The analysis of the gestational age distribution of the studied cases showed that the majority of women delivered between 38 and 39 weeks of gestation, comprising 16 (40.0%) cases, followed by 14 (35.0%) women who delivered between 37 and 38 weeks, 8 (20.0%) between 39 and 40 weeks, and 2 (5.0%) between 40 and 41 weeks. Overall, 40 (100%) women were included in the study [Table 2].

**Figure 1: Parity distribution of the study population (n = 40).****Table 2: Gestational age at delivery in the study population (n = 40).**

| Gestational Age (weeks) | Number (n) | Percentage (%) |
|-------------------------|------------|----------------|
| 37–38                   | 14         | 35.0           |
| 38–39                   | 16         | 40.0           |
| 39–40                   | 8          | 20.0           |
| 40–41                   | 2          | 5.0            |
| Total                   | 40         | 100            |

The analysis of the AFI category distribution of the studied cases showed that mild polyhydramnios, with an AFI of 25.0–29.9 cm, was the most common category, observed in 22 (55.0%) cases, followed by

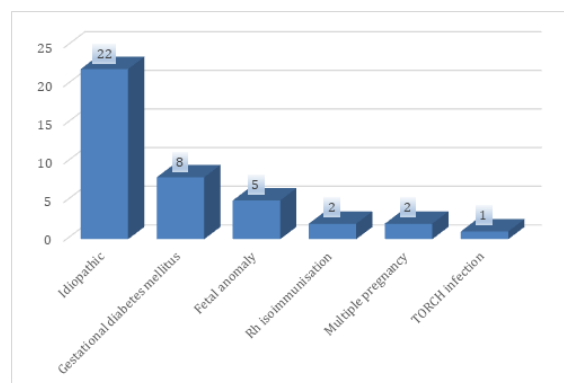
moderate polyhydramnios (AFI 30.0–34.9 cm) in 13 (32.5%) cases and severe polyhydramnios (AFI  $\geq 35.0$  cm) in 5 (12.5%) cases. Overall, 40 (100%) cases were included in the study [Table 3].

**Table 3: Severity of polyhydramnios by amniotic fluid index (AFI) classification (n = 40).**

| AFI Category | AFI Range (cm) | Number (n) | Percentage (%) |
|--------------|----------------|------------|----------------|
| Mild         | 25.0–29.9      | 22         | 55.0           |
| Moderate     | 30.0–34.9      | 13         | 32.5           |
| Severe       | $\geq 35.0$    | 5          | 12.5           |
| Total        |                | 40         | 100            |

The analysis of the aetiology of polyhydramnios in the studied cases showed that idiopathic polyhydramnios was the most common aetiology, identified in 22 (55.0%) cases, followed by gestational diabetes mellitus in 8 (20.0%) cases and fetal anomalies in 5 (12.5%) cases. Rh isoimmunisation and multiple pregnancy were each observed in 2 (5.0%) cases, while TORCH infection was the least common aetiology, reported in 1 (2.5%) case. Overall, 40 (100%) cases were included in the study [Figure 2].

Lower segment caesarean section was performed in 20 cases (50%). The rate of operative delivery increased significantly with rising AFI severity. No patient with severe polyhydramnios delivered vaginally [Table 4].

**Figure 2: Aetiology of polyhydramnios in the study population (n = 40).**

**Table 4: Mode of delivery stratified by AFI severity (n = 40). p = 0.027, Fisher's exact test.**

| Mode of Delivery                | Mild (n = 22) | Moderate (n = 13) | Severe (n = 5) | Total (n = 40) |
|---------------------------------|---------------|-------------------|----------------|----------------|
| Normal vaginal delivery         | 14 (63.6%)    | 4 (30.8%)         | 0 (0.0%)       | 18 (45.0%)     |
| Lower segment caesarean section | 7 (31.8%)     | 8 (61.5%)         | 5 (100.0%)     | 20 (50.0%)     |
| Instrumental delivery           | 1 (4.5%)      | 1 (7.7%)          | 0 (0.0%)       | 2 (5.0%)       |
| Total                           | 22 (100%)     | 13 (100%)         | 5 (100%)       | 40 (100%)      |

Premature rupture of membranes was the most frequent maternal complication, occurring in 8 cases (20%). Overall, 23 women (57.5%) experienced at

least one maternal complication during labour or the puerperium [Table 5].

**Table 5: Maternal complications in the study population (n = 40).**

| Complication                   | Number (n) | Percentage (%) |
|--------------------------------|------------|----------------|
| None                           | 17         | 42.5           |
| Premature rupture of membranes | 8          | 20.0           |
| Malpresentation                | 6          | 15.0           |
| Postpartum haemorrhage         | 5          | 12.5           |
| Cord prolapse                  | 2          | 5.0            |
| Placental abruption            | 2          | 5.0            |

NICU admission was required in 9 neonates (22.5%). Perinatal mortality was 7.5% (n = 3): two stillbirths and one early neonatal death. Adverse perinatal outcome was significantly more frequent in the

moderate and severe AFI groups (Table 6; p = 0.003, Fisher's exact test). Birth weight ranged from 2.1 to 4.2 kg. Low birth weight (<2.5 kg) was recorded in 8 neonates (20%) [Table 6].

**Table 6: Perinatal outcomes stratified by AFI severity (n = 40).**

| Perinatal Outcome           | Mild (n = 22) | Moderate (n = 13) | Severe (n = 5) | Total (n = 40) | p-value |
|-----------------------------|---------------|-------------------|----------------|----------------|---------|
| Apgar score <7 at 1 minute  | 5 (22.7%)     | 5 (38.5%)         | 2 (40.0%)      | 12 (30.0%)     | 0.540   |
| Apgar score <7 at 5 minutes | 1 (4.5%)      | 2 (15.4%)         | 1 (20.0%)      | 4 (10.0%)      | 0.420   |
| NICU admission              | 2 (9.1%)      | 4 (30.8%)         | 3 (60.0%)      | 9 (22.5%)      | 0.027   |
| Perinatal death             | 0 (0.0%)      | 1 (7.7%)          | 2 (40.0%)      | 3 (7.5%)       | 0.014   |
| Adverse perinatal outcome*  | 2 (9.1%)      | 5 (38.5%)         | 4 (80.0%)      | 11 (27.5%)     | 0.003   |
| Low birth weight (<2.5 kg)  | 3 (13.6%)     | 4 (30.8%)         | 1 (20.0%)      | 8 (20.0%)      | 0.483   |

## DISCUSSION

This retrospective observational study of 40 term pregnancies complicated by polyhydramnios at a tertiary care centre characterises the aetiological distribution, mode of delivery, maternal complications, and perinatal outcomes in this high-risk obstetric group. The findings are consistent with published literature while reflecting the profile of a tertiary referral setting where complex cases predominate.

Idiopathic polyhydramnios was the most common aetiology (55%), consistent with population estimates of 60–70% idiopathic cases. Gestational diabetes mellitus accounted for 20% and fetal anomaly for 12.5%. Rh isoimmunisation and multiple pregnancy each contributed 5%. These proportions are in keeping with the expected aetiological mix in a mixed antenatal population at an Indian tertiary centre, where gestational diabetes has an increasing prevalence and Rh isoimmunisation remains a documented contributor.

The caesarean section rate was 50% overall and rose from 31.8% in the mild group to 100% in the severe group (p = 0.027). Kechagias et al., in a systematic review and meta-analysis of 38 studies, reported a relative risk of 1.60 for caesarean delivery in women with idiopathic polyhydramnios compared to controls.<sup>[6]</sup> Vanda et al. documented a caesarean

section rate of 51.1% in a prospective cohort of polyhydramnios cases versus 21.1% in controls.<sup>[7]</sup> Our rate of 50% aligns closely with both reports. No patient with severe polyhydramnios delivered vaginally in this series. This finding is explained by the high rate of malpresentation in severe cases, combined with the risk of cord prolapse at abrupt decompression of markedly elevated amniotic fluid volumes.

NICU admission was required in 22.5% of neonates and rose with AFI severity from 9.1% (mild) to 60% (severe; p = 0.027). Asadi et al. reported significantly higher NICU admission rates in polyhydramnios pregnancies compared with normal pregnancies in a prospective study from a tertiary centre in Iran.<sup>[8]</sup> Tashfeen et al. identified a broad range of adverse pregnancy outcomes in polyhydramnios, including malpresentation, cord prolapse, and postpartum haemorrhage, in an Omani cohort.<sup>[9]</sup> Bakhsh et al. found adverse prenatal outcomes including neonatal intensive care admission to be significantly more frequent in a retrospective cohort of pregnancies with amniotic fluid disorders.<sup>[10]</sup> Together, these reports and our own data confirm that the risk of NICU-level neonatal care is substantially elevated across all severity grades of polyhydramnios.

Pasquini et al., focusing specifically on mild idiopathic polyhydramnios, found that neonatal morbidity and NICU admission rates remained

elevated compared with controls even in this relatively benign subgroup.<sup>[11]</sup> In our series, 9.1% of neonates in the mild group had an adverse outcome, underscoring that a mild AFI label should not translate into reduced vigilance. Bas Lando et al. studied labour complications in term idiopathic polyhydramnios and documented significantly elevated odds of malpresentation and cord prolapse compared with controls, consistent with our malpresentation rate of 15% and cord prolapse rate of 5%.<sup>[12]</sup>

Perinatal mortality was 7.5% (three deaths: two stillbirths and one early neonatal death). All deaths occurred in the moderate or severe AFI groups. Pagan et al. demonstrated that even mild idiopathic polyhydramnios carries a significantly higher rate of intrauterine fetal demise compared with matched controls, a finding that argues for active fetal surveillance even in the lowest severity tier.<sup>[13]</sup> Leclerc et al. confirmed through multivariable analysis that uterine atony from overdistension is the primary mechanism driving postpartum haemorrhage across all severity grades, consistent with our PPH rate of 12.5%.<sup>[14]</sup> Mazor et al. established polyhydramnios as an independent risk factor for perinatal mortality and intrapartum morbidity, with cord compression and abrupt fluid decompression at membrane rupture as key mechanisms.<sup>[15]</sup> Though their study was set in a preterm cohort, these mechanisms operate with equal relevance at term in cases of severe fluid excess.

Adverse perinatal outcome — defined as the composite of NICU admission, stillbirth, or early neonatal death — occurred in 27.5% of cases overall. The gradient by AFI severity was marked: 9.1% in the mild group, 38.5% in the moderate group, and 80.0% in the severe group ( $p = 0.003$ ). This strong association supports AFI-based severity classification as a practical bedside tool for risk stratification. Women with moderate or severe polyhydramnios warrant closer fetal surveillance, planned delivery with cord prolapse precautions, and ready access to neonatal intensive care.

The study has limitations. Its retrospective design meant that the analysis was dependent on the completeness and accuracy of information recorded in the hospital case papers, and variables that were inconsistently documented could not be evaluated. Amniotic fluid index measurement, fetal surveillance and delivery decisions followed routine departmental practice rather than a standardised study protocol, and ultrasonographic examinations were performed by different observers, introducing the possibility of measurement variation. The exclusion of records with incomplete outcome documentation may have introduced selection bias. The absence of a concurrent control group of pregnancies with normal amniotic fluid volume means that the observed complication rates cannot be directly attributed to polyhydramnios alone. The sample size of 40 cases restricts statistical power for subgroup analyses, particularly the severe AFI group ( $n = 5$ ). As a single

tertiary centre, the cohort includes complex referrals, and complication and mortality rates may exceed those of a community setting. Some perinatal deaths occurred in the context of fetal anomaly, which may have inflated the overall mortality.

## CONCLUSION

Polyhydramnios at term carries significant obstetric and perinatal risk. Idiopathic aetiology predominates, but gestational diabetes and fetal anomaly together account for approximately one third of cases. Caesarean delivery rates and adverse perinatal outcomes increase stepwise with AFI severity, supporting AFI-based risk stratification at the time of diagnosis. NICU admission was required in approximately one in five neonates, and perinatal mortality was 7.5%. Timely delivery at a tertiary care centre equipped with neonatal intensive care is essential for all women with polyhydramnios at term.

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