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Maternal Characteristics, Fetal Structural Anomalies and Neonatal Outcomes in Pregnancies Complicated by Polyhydramnios: A Retrospective Observational Study at Shri Atal Bihari Vajpayee Medical College and Research Institute.

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Abstract

Background: Polyhydramnios, characterized by excessive amniotic fluid volume, complicates approximately 1–2% of pregnancies and is associated with significant maternal, fetal, and neonatal morbidity. While many cases are idiopathic, maternal diabetes, fetal structural anomalies, chromosomal abnormalities, and congenital syndromes are well-recognized etiological factors. The presence of polyhydramnios increases the risk of malpresentation, preterm delivery, operative delivery, postpartum hemorrhage, neonatal intensive care unit (NICU) admission, and perinatal mortality. Early identification and appropriate antenatal surveillance are essential for improving maternal and neonatal outcomes. ***Objectives:*** To evaluate the maternal characteristics, fetal structural anomalies, genetic syndromes, obstetric complications, and neonatal outcomes among pregnancies complicated by polyhydramnios. ***Materials and Methods:*** A retrospective observational study was conducted in the Department of Obstetrics and Gynaecology at Shri Atal Bihari Vajpayee Medical College and Research Institute from January 2024 to June 2024. Medical records of 25 pregnant women diagnosed with polyhydramnios were reviewed. Maternal demographic characteristics, associated medical disorders, severity of polyhydramnios, antenatal ultrasonographic findings, fetal structural anomalies, obstetric complications, mode of delivery, and neonatal outcomes were analyzed using descriptive statistics. ***Results:*** Among the 25 pregnancies, 48% of women were older than 35 years. Diabetes mellitus was present in 60% of cases, while hypertension was documented in 60%. Mild polyhydramnios accounted for 48% of cases, moderate polyhydramnios for 32%, and severe polyhydramnios for 20%. Structural fetal anomalies included congenital heart disease (24%), central nervous system anomalies (12%), cleft lip (12%), cleft palate (8%), and duodenal atresia (4%). Down syndrome was identified in three neonates (12%), while Pierre Robin sequence was diagnosed in one neonate (4%). Spontaneous vaginal delivery occurred in 32% of pregnancies, instrumental vaginal delivery in 24%, and cesarean section in 44%. Malpresentation occurred in 28%, postpartum hemorrhage in 16%, and placental abruption in 4%. NICU admission was required in 60% of neonates, while neonatal mortality was observed in 12%. ***Conclusion:*** Polyhydramnios is associated with a high prevalence of maternal diabetes, fetal structural anomalies, operative delivery, and adverse neonatal outcomes. Detailed antenatal ultrasonography and multidisciplinary perinatal management are essential for improving pregnancy outcomes in women with polyhydramnios.

Keywords: Polyhydramnios; Fetal structural anomalies; Congenital anomalies; Down syndrome; Pregnancy outcomes; Neonatal outcomes; Maternal diabetes; NICU admission.

INTRODUCTION

Polyhydramnios refers to an abnormal increase in the volume of amniotic fluid and affects approximately 1–2% of all pregnancies. It is generally diagnosed when the amniotic fluid index (AFI) is 24 cm or more or when the deepest vertical pocket measures 8 cm or more on ultrasonography. Depending on the AFI, polyhydramnios is classified as mild, moderate, or severe. Although approximately half of all cases remain idiopathic, several maternal and fetal conditions have been implicated in its pathogenesis.

Maternal diabetes mellitus is one of the most common maternal causes of polyhydramnios due to fetal hyperglycemia and osmotic diuresis. Hypertensive disorders, fetal anemia, Rh isoimmunization, multiple gestation, and congenital infections have also been associated with excessive amniotic fluid accumulation. Fetal structural anomalies, particularly those

affecting swallowing or gastrointestinal patency, contribute significantly to the development of polyhydramnios. Gastrointestinal anomalies such as esophageal and duodenal atresia, central nervous system anomalies including anencephaly and hydrocephalus, congenital heart disease, and craniofacial anomalies such as cleft palate are frequently encountered.

Chromosomal abnormalities and genetic syndromes, including Down syndrome, Edwards syndrome, Patau syndrome, Beckwith-Wiedemann syndrome, and Pierre Robin sequence, are also recognized associations. The coexistence of structural anomalies and genetic disorders further increases the risk of adverse pregnancy outcomes.

Pregnancies complicated by polyhydramnios are associated with increased obstetric complications such as preterm labor, malpresentation, premature rupture of membranes, umbilical cord prolapse, placental abruption, postpartum hemorrhage, and increased rates of operative delivery. Neonates born following pregnancies complicated by polyhydramnios are more likely to require NICU admission due to respiratory distress, congenital anomalies, feeding difficulties, and sepsis. Perinatal mortality also remains significantly higher compared with uncomplicated pregnancies.

Despite advances in antenatal imaging and fetal medicine, polyhydramnios continues to pose diagnostic and therapeutic challenges, particularly in resource-limited settings. Understanding the maternal characteristics, fetal anomalies, and neonatal outcomes associated with polyhydramnios can facilitate timely diagnosis, optimize antenatal surveillance, and improve perinatal care.

The present retrospective observational study was undertaken at Shri Atal Bihari Vajpayee Medical College and Research Institute to evaluate the maternal profile, fetal structural anomalies, genetic syndromes, obstetric complications, and neonatal outcomes among pregnancies complicated by polyhydramnios during the study period.

Objectives

Primary Objective

To evaluate the maternal characteristics, fetal structural anomalies, genetic syndromes, and neonatal outcomes among pregnancies complicated by polyhydramnios.

Secondary Objectives

1. To determine the severity of polyhydramnios among the study population.
2. To identify maternal medical disorders associated with polyhydramnios.
3. To evaluate fetal structural anomalies detected on antenatal ultrasonography.
4. To assess obstetric complications and mode of delivery in pregnancies complicated by polyhydramnios.
5. To evaluate neonatal outcomes including birth weight, Apgar score, NICU admission, and neonatal mortality.

MATERIALS AND METHODS

Study design

A retrospective observational study.

Study setting

The study was conducted in the Department of Obstetrics and Gynaecology, Shri Atal Bihari Vajpayee Medical College and Research Institute.

Study period

January 2024 to June 2024.

Study population

All pregnant women diagnosed with polyhydramnios during the study period whose medical records were available for review.

Sample size

A total of 25 pregnancies complicated by polyhydramnios were included in the study.

Inclusion criteria

- Pregnant women diagnosed with polyhydramnios by ultrasonography (AFI ≥24 cm or deepest vertical pocket ≥8 cm).
- Singleton pregnancies.
- Complete maternal and neonatal records available.

Exclusion criteria
- Incomplete medical records.
- Multiple pregnancies.
- Pregnancies with missing neonatal outcome data.

Data collection
Data were retrieved from inpatient case records, antenatal records, labour room registers, ultrasonography reports, and neonatal records.
The following variables were collected:

Maternal characteristics
- Maternal age
- Gestational age at delivery
- Diabetes mellitus
- Hypertension

Polyhydramnios characteristics
- Mild
- Moderate
- Severe

Antenatal ultrasound findings
- Central nervous system anomalies
- Congenital heart disease
- Soft markers for chromosomal abnormalities

Fetal structural anomalies
- Agenesis of corpus callosum
- Dandy-Walker malformation
- Hydrocephalus
- Duodenal atresia
- Congenital heart disease
- Cleft lip
- Cleft palate

Genetic syndromes
- Down syndrome
- Pierre Robin sequence

Delivery details
- Spontaneous vaginal delivery
- Instrumental vaginal delivery
- Lower segment caesarean section
- Malpresentation
- Postpartum hemorrhage
- Placental abruption

Neonatal outcomes
- Sex
- Birth weight
- Apgar score at 5 minutes
- NICU admission
- Neonatal mortality

Outcome measures
Primary outcomes
- Maternal characteristics
- Fetal structural anomalies

- Genetic syndromes
- Neonatal outcomes

Secondary outcomes
- Severity of polyhydramnios
- Obstetric complications
- Mode of delivery
- Birth weight distribution

Statistical analysis
The collected data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 26.0 (or equivalent statistical software). Continuous variables were expressed as mean ± standard deviation where applicable, while categorical variables were expressed as frequencies and percentages. The results are presented using descriptive statistics in tables and figures.

Ethical considerations
The study was conducted after obtaining approval from the Institutional Ethics Committee of Shri Atal Bihari Vajpayee Medical College and Research Institute. As this was a retrospective record-based study, patient confidentiality and anonymity were maintained throughout the study. Personal identifiers were removed during data collection, and the study adhered to the ethical principles of the Declaration of Helsinki.

RESULTS
A total of **25 pregnancies complicated by polyhydramnios** were included in the study. Maternal demographic characteristics, associated maternal disorders, severity of polyhydramnios, fetal structural anomalies, obstetric complications, and neonatal outcomes were analyzed.

Table 1. Maternal characteristics of the study population (n = 25)

Variable	Number (n)	Percentage (%)
Maternal age (years)		
18–25	8	32
25–35	5	20
>35	12	48
Gestational age at delivery		
Preterm	8	32
Term	10	40
Post-dated	4	16
Post-term	3	12

Interpretation: Nearly half (48%) of women were older than 35 years. Term delivery was the most common gestational age at delivery (40%).

Table 2. Maternal medical disorders

Maternal disorder	Number (n)	Percentage (%)
Diabetes mellitus (diet controlled)	10	40
Diabetes mellitus (insulin treated)	5	20
Hypertension	15	60

Interpretation: Diabetes mellitus was present in 60% of women (diet-controlled and insulin-treated combined), while hypertension was observed in 60%.

Table 3. Severity of polyhydramnios

Severity	Number (n)	Percentage (%)
Mild	12	48
Moderate	8	32
Severe	5	20

Interpretation: Mild polyhydramnios was the most common presentation (48%).

Table 4. Antenatal ultrasonographic findings

Finding	Number (n)	Percentage (%)
Central nervous system anomalies	3	12
Congenital heart disease	6	24
Soft markers for chromosomal abnormalities	5	20

Interpretation: Congenital heart disease was the most frequent antenatally detected fetal abnormality (24%).

Table 5. Fetal structural anomalies

Structural anomaly	Number (n)	Percentage (%)
Agenesis of corpus callosum	1	4
Dandy-Walker malformation	1	4
Hydrocephalus	1	4
Duodenal atresia	1	4
Congenital heart disease	6	24
Cleft lip	3	12
Cleft palate	2	8

Interpretation: Congenital heart disease was the commonest structural anomaly, followed by cleft lip and cleft palate.

Table 6. Genetic syndromes associated with polyhydramnios

Syndrome	Number (n)	Percentage (%)
Down syndrome	3	12
Pierre Robin sequence	1	4

Interpretation: Down syndrome was the most common genetic syndrome identified.

Table 7. Obstetric complications and mode of delivery

Variable	Number (n)	Percentage (%)
Mode of delivery		
Spontaneous vaginal delivery	8	32
Instrumental vaginal delivery	6	24
Lower segment caesarean section	11	44
Obstetric complications		
Malpresentation	7	28
Postpartum hemorrhage	4	16
Placental abruption	1	4

Interpretation: Caesarean section was the most common mode of delivery (44%). Malpresentation was the most frequent obstetric complication (28%).

Table 8. Neonatal outcomes

Variable	Number (n)	Percentage (%)
Sex		
Male	11	44
Female	14	56
Birth weight		
<2.5 kg	6	24
2.5–4.0 kg	18	72
>4.0 kg	1	4
Apgar score <7 at 5 minutes	3	12
NICU admission	15	60
Neonatal mortality	3	12

Interpretation: Most neonates (72%) had a birth weight of 2.5–4.0 kg. NICU admission was required in 60% of newborns, while neonatal mortality was 12%.

DISCUSSION

Polyhydramnios is an important obstetric condition associated with increased maternal, fetal, and neonatal morbidity. The present retrospective observational study evaluated 25 pregnancies complicated by polyhydramnios managed at Shri Atal Bihari Vajpayee Medical College and Research Institute between January 2024 and June 2024.

Nearly half (48%) of the women in the present study were older than 35 years, suggesting that advanced maternal age may be an important demographic characteristic among pregnancies complicated by polyhydramnios. Previous studies have similarly reported a higher prevalence of maternal age above 30 years in affected pregnancies.

Maternal diabetes mellitus was present in 60% of cases, making it the most common associated maternal medical disorder. Maternal hyperglycemia results in fetal hyperglycemia and osmotic diuresis, leading to excessive fetal urine production and increased amniotic fluid volume. Hypertension was also observed in 60% of women. These findings emphasize the importance of screening for maternal metabolic and hypertensive disorders in pregnancies complicated by polyhydramnios.

With respect to disease severity, mild polyhydramnios constituted 48% of cases, followed by moderate (32%) and severe (20%) polyhydramnios. This distribution is comparable to previously published studies in which mild polyhydramnios represented the majority of cases.

Congenital heart disease was the most frequent fetal structural anomaly (24%), followed by craniofacial anomalies, including cleft lip (12%) and cleft palate (8%). Central nervous system anomalies were identified in 12% of fetuses, including agenesis of the corpus callosum, Dandy-Walker malformation, and hydrocephalus. One fetus had duodenal atresia, a gastrointestinal anomaly classically associated with polyhydramnios due to impaired fetal swallowing.

Among genetic syndromes, Down syndrome was diagnosed in three neonates (12%), while Pierre Robin sequence was identified in one neonate (4%). It is important to recognize that structural anomalies and genetic syndromes frequently coexist. For example, fetuses with Down syndrome may also present with congenital heart disease or duodenal atresia, while Pierre Robin sequence is commonly associated with cleft palate. Therefore, these categories overlap and should not be interpreted as independent causes.

Obstetric complications were common. Malpresentation occurred in 28% of pregnancies, likely secondary to excessive amniotic fluid allowing increased fetal mobility. Caesarean section was performed in 44% of women, reflecting the increased incidence of malpresentation and fetal anomalies. Postpartum hemorrhage occurred in 16% of deliveries, while placental abruption was observed in one patient.

Neonatal morbidity was considerable. Sixty percent of newborns required NICU admission, primarily because of prematurity, congenital anomalies, respiratory distress, or feeding difficulties. Low Apgar scores at five minutes were observed in 12% of neonates, and neonatal mortality was 12%, reflecting the significant perinatal risks associated with pregnancies complicated by polyhydramnios.

Overall, the findings of the present study reinforce that polyhydramnios is associated with significant maternal comorbidities, fetal structural abnormalities, operative delivery, and adverse neonatal outcomes. Careful antenatal evaluation, detailed fetal anomaly scanning, timely referral to tertiary care centers, and multidisciplinary perinatal management are essential for improving pregnancy outcomes.

Strengths

- Comprehensive evaluation of maternal, fetal, obstetric, and neonatal outcomes.
- Inclusion of antenatal ultrasonographic findings and postnatal confirmation of congenital anomalies.
- Real-world data from a tertiary care teaching hospital.

Limitations

- Retrospective study design.
- Small sample size.
- Single-center study, limiting generalizability.
- Genetic testing was not available for all suspected congenital syndromes.
- Long-term neonatal follow-up was not performed.

CONCLUSION

Polyhydramnios remains an important high-risk obstetric condition associated with significant maternal and neonatal morbidity. Maternal diabetes mellitus and hypertension were frequently associated with polyhydramnios in the present

study. Congenital heart disease was the most common fetal structural anomaly, while Down syndrome represented the most frequently identified genetic syndrome. The condition was associated with increased rates of malpresentation, operative delivery, NICU admission, and neonatal mortality.

Early diagnosis through routine antenatal ultrasonography, detailed fetal anomaly evaluation, appropriate maternal metabolic control, and multidisciplinary obstetric and neonatal care are essential for improving maternal and neonatal outcomes in pregnancies complicated by polyhydramnios.

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