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Original Article

Feto-Maternal Outcomes in Pregnancies with Abnormal Amniotic Fluid Volume: A Prospective Cohort Study

Corresponding Author:
Dr. Sreelekha Theppala
PG student

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Dr. Mahaboob Unnisa Nasreen[1], Dr. Vijaya Lakshmi Upputuri[2], Dr. Sreelekha Theppala[3], Dr. Koppala Bhavani[4]

[1]MS (OBG) MRCOG (UK), Associate Professor, Department of Obstetrics and Gynaecology, Government Medical College, Eluru

[2]MS (OBG) Associate Professor, Department of Obstetrics and Gynaecology, Government Medical College, Eluru

[3]PG student

[4]Professor & HOD, Department of Obstetrics and Gynaecology, Government Medical College, Eluru

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ABSTRACT

Background: Amniotic fluid volume is an important indicator of fetal and maternal health, and abnormalities may be associated with adverse obstetric and perinatal outcomes. This study assessed fetomaternal outcomes among pregnancies complicated by oligohydramnios and polyhydramnios.

Methods: This prospective observational cohort study included 100 pregnant women admitted to Government General Hospital, Eluru, Andhra Pradesh, India. Participants were divided into two groups: oligohydramnios (n=50) and polyhydramnios (n=50). Maternal characteristics, mode of delivery, birth weight, Apgar scores at 1 and 5 minutes, NICU admission, neonatal outcomes, and maternal complications were assessed. Statistical comparisons were performed between the two groups.

Results: The mean maternal age was 28.56 ± 6.80 years, and the mean gestational age was 33.05 ± 3.64 weeks. Caesarean and instrumental deliveries each accounted for 37% of births, while normal vaginal delivery accounted for 26%. NICU admission was recorded in 45% of neonates. In the separately reported neonatal-outcome categories, 35% were classified as deaths, 32% as healthy, and 33% as NICU cases. Postpartum haemorrhage, infection, and pregnancy-induced hypertension occurred in 27%, 23%, and 18% of participants, respectively. No statistically significant between-group differences were reported for mode of delivery (p=0.973), neonatal outcome (p=0.970), NICU admission (p=0.310), maternal complications (p=0.278), birth weight (p=0.272), or Apgar scores. AFI differed significantly between the groups (p<0.001).

Conclusion: Abnormal amniotic fluid volume was associated with frequent obstetric intervention and notable maternal and neonatal complications in this hospital-based cohort. Comprehensive antenatal assessment and appropriate intrapartum and neonatal care are important in managing these pregnancies.

Keywords: Amniotic fluid; Oligohydramnios; Polyhydramnios; Pregnancy outcome; Apgar score; Neonatal intensive care unit.

INTRODUCTION

Amniotic fluid plays an essential role in fetal development by providing mechanical protection, facilitating fetal movement, supporting pulmonary and musculoskeletal development, and reducing umbilical cord compression. Its volume varies throughout gestation and is regulated by the balance between fetal urine production, fetal swallowing, intramembranous transfer, and maternal–placental influences. Abnormal amniotic fluid volume may therefore indicate underlying fetal, placental, or maternal pathology rather than an isolated ultrasonographic finding [1,2].

Oligohydramnios refers to reduced amniotic fluid volume and is commonly assessed using ultrasonographic measurements such as the amniotic fluid index (AFI) or single deepest vertical pocket. It may be associated with placental insufficiency, fetal growth restriction, fetal urinary tract abnormalities, and other high-risk pregnancy conditions. Reduced fluid volume may also increase the risk of umbilical cord compression and non-reassuring fetal heart-rate patterns during labour. Previous observational studies have described associations between oligohydramnios and intrapartum fetal compromise, although these associations depend on gestational age, the underlying clinical condition, and the method used to assess amniotic fluid volume [3–5].

Polyhydramnios denotes excessive amniotic fluid volume and may be associated with maternal diabetes, fetal structural or swallowing abnormalities, fetal anaemia, or other maternal and fetal conditions; in some cases, no underlying cause is identified. Excessive fluid can contribute to uterine overdistension, malpresentation, preterm labour, dysfunctional labour, and postpartum haemorrhage, potentially increasing the need for obstetric intervention. Clinical outcomes vary according to the severity of polyhydramnios and the presence of associated maternal or fetal disorders [6,7].

Ultrasonography is central to the assessment of amniotic fluid volume; however, measurements should be interpreted in conjunction with gestational age, fetal growth, fetal anatomy, maternal conditions, and clinical findings. Studies evaluating pregnancies complicated by abnormal amniotic fluid volume have reported varying frequencies of caesarean delivery, neonatal intensive care unit (NICU) admission, low Apgar scores, and adverse perinatal outcomes. Differences in study populations, outcome definitions, associated complications, referral patterns, and availability of neonatal services may contribute to these variations [3,5,8]. Assessing outcomes in individual hospital settings can help describe the clinical profile of affected pregnancies and inform the provision of appropriate antenatal surveillance and intrapartum care.

The present study evaluated fetomaternal outcomes among pregnancies complicated by abnormal amniotic fluid volume at a government hospital in Eluru, Andhra Pradesh, India. The objectives were to describe obstetric outcomes in pregnancies with oligohydramnios and polyhydramnios and to compare selected maternal and neonatal outcomes between the two groups.

MATERIALS AND METHODS

Study Design and Setting: This prospective observational cohort study was conducted in the Department of Obstetrics and Gynaecology, Government General Hospital, Eluru, Andhra Pradesh, India. The study was conducted over a period of 12 months following approval of the study protocol by the protocol review committee and Institutional Ethics Committee.

Study Population and Sampling: The study included 100 pregnant women admitted to the obstetrics and gynaecology inpatient department who met the eligibility criteria. Participants were classified into two groups according to amniotic fluid index (AFI): oligohydramnios (AFI ≤5 cm; n=50) and polyhydramnios (AFI ≥25 cm; n=50). Simple random sampling was the sampling method.

Eligibility Criteria: The study included women with singleton pregnancies, gestational ages between 28 and 42 weeks, intact fetal membranes, and an AFI consistent with the respective study group. Women with intrauterine fetal demise, pre-labour rupture of membranes, or post-term pregnancy were excluded.

Data Collection and Study Outcomes: Participants were followed prospectively for obstetric and perinatal outcomes. Data were collected on maternal age, gestational age, antenatal booking status, gravidity, parity, AFI, mode of delivery, neonatal birth weight, Apgar scores at 1 and 5 minutes, neonatal intensive care unit (NICU) admission, neonatal outcome, and maternal complications. Maternal complications were classified as infection, pregnancy-induced hypertension (PIH), postpartum haemorrhage (PPH), or no complication. Neonatal outcomes were categorized as death, healthy, or NICU admission, as reported in the study tables. The study was observational, and no additional investigations were performed specifically for research purposes.

Statistical Analysis: Categorical variables were summarized as frequencies and percentages, while continuous variables were expressed as means and standard deviations. Comparisons between the oligohydramnios and polyhydramnios groups

were performed using appropriate statistical tests. Analysis of variance (ANOVA) was used for selected continuous variables. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations: The study received approval from the Institutional Ethics Committee (Reference No. 449/E1/DNB/2024).

RESULTS

The study included 100 women, equally divided between oligohydramnios and polyhydramnios. Mean maternal age was 28.56 ±6.80 years and mean gestational age was 33.05 ±3.64 weeks.

Table 1. Maternal and pregnancy characteristics (N = 100)

Characteristic	Category / statistic	n (%) or mean ± SD
Maternal age (years)	18–27	48 (48%)
	28–37	39 (39%)
	38–47	13 (13%)
	Mean ± SD	28.56 ± 6.80
Gestational age (weeks)	28	13 (13%)
	29	6 (6%)
	30	12 (12%)
	31	13 (13%)
	32	6 (6%)
	33	7 (7%)
	34	6 (6%)
	35	3 (3%)
	36	11 (11%)
	37	7 (7%)
	38	7 (7%)
	39	9 (9%)
	Mean ± SD	33.05 ± 3.64
Booking status	Booked	48 (48%)
	Unbooked	52 (52%)
Gravida	1	20 (20%)
	2	18 (18%)
	3	18 (18%)
	4	25 (25%)
	5	19 (19%)
Parity	0	32 (32%)
	1	27 (27%)
	2	21 (21%)
	3	20 (20%)

Values are presented as number (percentage), unless otherwise indicated.

Nearly half of participants were aged 18–27 years, and just over half were unbooked. Participants represented a range of gravidity and parity categories.

Table 2. Mode of delivery in the overall cohort and by AFI group

Mode of delivery	Overall (N=100), n (%)	Oligohydramnios (n=50), n (%)	Polyhydramnios (n=50), n (%)	p-value
Caesarean	37 (37%)	19 (38%)	18 (36%)	0.973
Instrumental	37 (37%)	18 (36%)	19 (38%)	0.973
Normal vaginal	26 (26%)	13 (26%)	13 (26%)	0.973
Total	100 (100%)	50 (100%)	50 (100%)	—

The p-value represents the overall comparison of mode of delivery between the two groups.

Caesarean and instrumental deliveries each accounted for more than one-third of births. The comparison did not indicate a statistically significant difference in mode of delivery between the two AFI groups (p=0.973).

Table 3. Neonatal condition and care in the overall cohort

Outcome	n (%)
Apgar score at 1 minute: mean ± SD	5.21 ± 2.67
Apgar score at 5 minutes: mean ± SD	6.14 ± 1.86
NICU admission: Yes	45 (45%)
NICU admission: No	55 (55%)
Neonatal outcome recorded as death	35 (35%)
Neonatal outcome recorded as healthy	32 (32%)
Neonatal outcome recorded as NICU	33 (33%)

NICU admission and neonatal outcome are presented as separately recorded variables.

The mean Apgar score increased between 1 and 5 minutes. NICU admission was recorded in 45% of neonates. The separate neonatal-outcome variable classified 35% as deaths, 32% as healthy, and 33% as NICU.

Table 4. Maternal complications in the overall cohort and by AFI group

Maternal complication	Overall (N=100), n (%)	Oligohydramnios (n=50), n (%)	Polyhydramnios (n=50), n (%)
Infection	23 (23%)	10 (20%)	13 (26%)
No complication	32 (32%)	19 (38%)	13 (26%)
PIH	18 (18%)	6 (12%)	12 (24%)
PPH	27 (27%)	15 (30%)	12 (24%)
Total	100 (100%)	50 (100%)	50 (100%)

PIH = pregnancy-induced hypertension; PPH = postpartum haemorrhage.

A maternal complication was recorded in 68% of participants. PPH was the most frequent listed complication, followed by infection and PIH. The group comparison was not statistically significant (p=0.278).

Table 5. Comparison of neonatal outcomes by AFI group

Outcome	Oligohydramnios (n=50), n (%)	Polyhydramnios (n=50), n (%)	p-value
Death	18 (36%)	17 (34%)	0.970
Healthy	16 (32%)	16 (32%)	0.970
NICU category in neonatal outcome variable	16 (32%)	17 (34%)	0.970
NICU admission: Yes	20 (40%)	25 (50%)	0.31
NICU admission: No	30 (60%)	25 (50%)	0.31

Neonatal outcome and NICU admission were recorded as separate variables.

There was no statistically significant between-group difference in the three-category neonatal outcome (p=0.970). NICU admission was numerically higher in the polyhydramnios group (p=0.31).

Table 6. Continuous variables and reported ANOVA comparisons

Variable	Overall mean ± SD	Reported p-value, oligohydramnios vs polyhydramnios
Maternal age (years)	28.56 ± 6.804	0.242
Gestational age (weeks)	33.05 ± 3.644	0.978
AFI (cm)	17.82 ± 14.736	<0.001
Birth weight (kg)	2.5853 ± 0.87245	0.272
Apgar score at 1 minute	5.21 ± 2.672	0.435
Apgar score at 5 minutes	6.14 ± 1.864	0.286

ANOVA was used for the reported comparisons. AFI differed significantly between groups (p<0.001).
There were no statistically significant between-group differences in maternal age, gestational age, birth weight, or Apgar scores. AFI differed significantly between groups, consistent with the group definitions.

DISCUSSION

In this prospective observational study of 100 pregnancies complicated by abnormal amniotic fluid volume, caesarean and instrumental deliveries each accounted for 37% of births, while normal vaginal delivery accounted for 26%. The mean Apgar scores were 5.21 ±2.67 at 1 minute and 6.14 ±1.86 at 5 minutes. NICU admission was recorded in 45% of neonates. The principal maternal complications were postpartum haemorrhage (PPH), infection, and pregnancy-induced hypertension (PIH), reported in 27%, 23%, and 18% of participants, respectively. These findings illustrate the range of obstetric interventions and maternal and neonatal outcomes among women with abnormal amniotic fluid volume in a tertiary care hospital.

Amniotic fluid volume is an important component of antenatal assessment because deviations from the expected range may be associated with underlying maternal, placental, or fetal conditions. In oligohydramnios, reduced fluid volume may increase the risk of umbilical cord compression and intrapartum fetal heart-rate abnormalities. Previous studies have examined the relationship between reduced amniotic fluid volume and fetal compromise during labour [9-12]. Research has also investigated the association between oligohydramnios and adverse neonatal outcomes [11,12]. Polyhydramnios, in contrast, may be associated with maternal diabetes, fetal structural abnormalities, and disorders affecting fetal swallowing. Excessive fluid volume can contribute to uterine overdistension, malpresentation, dysfunctional labour, and postpartum haemorrhage [6,7]. These differing clinical characteristics underscore the importance of assessing oligohydramnios and polyhydramnios as distinct conditions when planning obstetric care.

In the present study, caesarean delivery occurred in 38% of women with oligohydramnios and 36% of those with polyhydramnios, while instrumental delivery occurred in 36% and 38%, respectively. Normal vaginal delivery accounted for 26% of births in each group. The difference in mode of delivery between the groups was not statistically significant ($p=0.973$). These findings indicate a similar distribution of delivery modes in the two study groups. Obstetric intervention in pregnancies with abnormal amniotic fluid volume may be influenced by fetal condition, labour progress, presentation, and the clinical circumstances surrounding delivery. The observed distribution highlights the role of intrapartum assessment and appropriate obstetric management in these pregnancies.

The mean Apgar scores were 5.21 ±2.67 at 1 minute and 6.14 ±1.86 at 5 minutes. No statistically significant between-group differences were reported for the 1-minute Apgar score ($p=0.435$) or the 5-minute Apgar score ($p=0.286$). Similarly, the difference in birth weight between the groups was not statistically significant ($p=0.272$). These results describe the neonatal condition at birth and the distribution of birth weight in the study population. Apgar scores provide a clinical assessment of neonatal adaptation immediately after birth, while birth weight contributes to the assessment of neonatal status in relation to gestational age and fetal growth.

NICU admission was recorded in 40% of neonates in the oligohydramnios group and 50% in the polyhydramnios group, with no statistically significant difference between the groups ($p=0.310$). The reported neonatal-outcome categories comprised death in 35% of cases, healthy status in 32%, and NICU classification in 33%. The comparison of neonatal outcomes between the two groups was not statistically significant ($p=0.970$). These findings demonstrate the neonatal care requirements and outcomes reported in the cohort. The interpretation of between-group comparisons should take into account the sample size of 50 participants in each group; the absence of statistical significance does not establish equivalence between oligohydramnios and polyhydramnios.

Regarding maternal outcomes, PPH was reported in 27% of participants, infection in 23%, and PIH in 18%, while 32% had no recorded maternal complication. The distribution of maternal complications did not differ significantly between the oligohydramnios and polyhydramnios groups ($p=0.278$). Maternal outcomes in pregnancies complicated by abnormal amniotic fluid volume may be influenced by associated obstetric conditions, labour characteristics, and the mode of delivery. Recognition of potential complications and appropriate intrapartum and postpartum surveillance remain important components of clinical management.

The study also found that 52% of participants were unbooked, compared with 48% who were booked. This distribution highlights the importance of antenatal registration and regular follow-up for the early identification and assessment of high-risk pregnancies. Ultrasonographic assessment of amniotic fluid volume should be integrated with gestational age, fetal growth, fetal anatomy, maternal clinical status, and other relevant findings. The interpretation of fluid measurements also depends on the method used and the clinical context in which the assessment is performed [2,8-10].

The study provides a prospective assessment of maternal and neonatal outcomes in pregnancies with oligohydramnios and polyhydramnios in a government hospital setting. The single-centre design and sample size of 100 participants limit the generalisability of the findings. Nevertheless, the observed patterns of delivery, neonatal outcomes, and maternal

complications provide a clinical description of pregnancies affected by abnormal amniotic fluid volume. Larger multicentre studies may further clarify the patterns of fetomaternal outcomes associated with these conditions and support evidence-based approaches to antenatal surveillance and obstetric management.

CONCLUSION

In this hospital-based study of 100 pregnancies with abnormal amniotic fluid volume, caesarean and instrumental deliveries each accounted for 37% of births, while NICU admission was recorded in 45% of neonates. Postpartum haemorrhage and infection were the principal maternal complications. No statistically significant differences were observed between the oligohydramnios and polyhydramnios groups for the reported maternal and neonatal outcomes, although amniotic fluid index differed significantly between the groups. These findings highlight the importance of comprehensive antenatal assessment, appropriate intrapartum monitoring, and timely management of maternal and neonatal complications in pregnancies complicated by abnormal amniotic fluid volume. Larger multicentre studies with adequate sample sizes and clearly defined clinical outcomes are warranted to further evaluate fetomaternal outcomes in these pregnancies.

DECLARATIONS

- **Ethical approval:** Institutional Ethics Committee approval was obtained (Ref. No. 449/E1/DNB/2024).
- **Informed consent:** The study was conducted in accordance with institutional ethical requirements.
- **Funding**: No external funding was reported.
- **Conflicts of interest:** None declared.
- **Data availability:** Data supporting the findings are available from the corresponding author on reasonable request.

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