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Original Research Article

Fetomaternal Outcome Associated With Oligohydramnios In Uncomplicated Term Pregnancies

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Abstract: *Oligohydramnios, defined as an amniotic fluid index (AFI) ≤5 cm, is associated with adverse perinatal outcomes in term pregnancies. In resource-limited settings like Pakistan, the implications of this condition remain underexplored. This study investigates the fetomaternal outcomes associated with oligohydramnios in otherwise uncomplicated term pregnancies.* ***Objective:*** *To evaluate and compare the maternal and neonatal outcomes among term pregnant women with oligohydramnios (AFI ≤5 cm) and those with normal amniotic fluid levels (AFI >5 cm).* ***Methods:*** *A prospective cohort study was conducted at Sheikh Zayed Hospital, Rahim Yar Khan, from February to April 2025. A total of 112 pregnant women at 37–42 weeks of gestation were enrolled and divided into two groups: Group A (AFI ≤5 cm) and Group B (AFI >5 cm), each with 56 participants. Exclusion criteria included medical or obstetric complications and fetal anomalies. Primary outcomes measured included mode of delivery, birth weight, APGAR scores, intrauterine growth restriction (IUGR), meconium-stained liquor, NICU admissions, and neonatal death. Statistical analyses included Chi-square tests and relative risk (RR) calculations, with a p-value <0.05 considered significant.* ***Results:*** *Labor induction (53.6% vs. 30.4%, p=0.01) and cesarean delivery (60.7% vs. 32.1%, p=0.002) were significantly more frequent in the oligohydramnios group. Adverse neonatal outcomes such as low birth weight (32.1% vs. 10.7%, p=0.005), low APGAR scores at 5 minutes (17.9% vs. 5.4%, p=0.04), meconium-stained liquor (25.0% vs. 7.1%, p=0.01), IUGR (23.2% vs. 7.1%, p=0.02), and NICU admission (21.4% vs. 5.4%, p=0.01) were significantly higher in Group A. The highest relative risk was observed for NICU admissions (RR = 3.96), followed by meconium-stained liquor (RR = 3.50), and IUGR (RR = 3.27).* ***Conclusion:*** *Oligohydramnios in term pregnancies is significantly associated with increased rates of labor induction, cesarean delivery, and adverse neonatal outcomes, including low birth weight, lower APGAR scores, meconium-stained amniotic fluid, IUGR, and NICU admissions. These findings underscore the need for timely identification and close monitoring of such cases to improve fetomaternal outcomes.*

Keywords: Oligohydramnios, amniotic fluid index, fetomaternal outcomes, cesarean delivery, neonatal morbidity, NICU, term pregnancy

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Introduction

Oligohydramnios, characterized by a lower-than-normal volume of amniotic fluid, is a condition that warrants significant attention, particularly in the context of term pregnancies. Its implications for both fetal and maternal outcomes are profound, making it a critical area of investigation among obstetric professionals. Oligohydramnios is typically identified when the amniotic fluid index (AFI) falls below 5 cm or the single deepest pocket measures less than 2 cm. In uncomplicated term pregnancies, oligohydramnios has been associated with various adverse outcomes, including increased risks of cesarean delivery, fetal distress, and neonatal morbidity and mortality (1, 2, 3).

In the Pakistani context, oligohydramnios is a relevant concern due to various socioeconomic factors that impact maternal and fetal health. Limited access to prenatal care, disparities in healthcare infrastructure, and varying levels of public awareness can exacerbate the incidence and consequences of oligohydramnios (1, 2, 4). Furthermore, the relatively high rates of fetal growth restriction and congenital anomalies linked to oligohydramnios underscore the need for targeted research and interventions in developing countries, including Pakistan (1, 5).

Studies indicate that pregnancies affected by oligohydramnios at term present with higher rates of complications, including low APGAR scores, the necessity for neonatal intensive care unit (NICU) admissions, and increased chances of stillbirth 6, 7. For instance, evidence shows a significant correlation between oligohydramnios and negative outcomes such as meconium-stained amniotic fluid and intrauterine growth restriction (IUGR) 8, 9. Research suggests that the clinical management of oligohydramnios may necessitate early delivery to mitigate these risks, adding complexity to prenatal care strategies (5, 9).

In light of such challenges, conducting meticulous studies examining the fetomaternal outcomes associated with oligohydramnios—particularly in uncomplicated pregnancies at term—becomes crucial. There exists a substantial gap in localized evidence that can inform practice guidelines specific to Pakistan. Exploring these outcomes is vital for improving maternal-fetal health services and enhancing the overall standard of care. Given the increasing recognition of obstetric complications associated with oligohydramnios, particularly in resource-constrained settings like Pakistan, there is a pressing need to investigate the specific fetomaternal outcomes linked to this condition. Such studies can provide invaluable insights that not only shape clinical practice but also influence health policy measures aimed at improving pregnancy outcomes in this demographic. The findings are expected to contribute to developing comprehensive clinical protocols for managing oligohydramnios in Pakistani obstetric care settings.

Methodology

This prospective cohort study was conducted at the Department of Obstetrics and Gynecology, Sheikh Zayed Hospital, Rahim Yar Khan, over a duration of three months from February to April 2025, following ethical approval. The objective was to determine the association between oligohydramnios, defined as an amniotic fluid index (AFI) ≤ 5 cm, and adverse fetomaternal outcomes in otherwise uncomplicated term pregnancies. The study population included pregnant women aged 18 to 45 years, with gestational age between 37 and 42 weeks, and having singleton pregnancies with intact placentas. A total of 112 participants were enrolled using non-probability consecutive sampling and were

equally divided into two groups: Group A (AFI ≤ 5 cm) and Group B (AFI > 5 cm).

Women with medical or obstetric complications such as pregnancy-induced hypertension, preeclampsia, eclampsia, antepartum hemorrhage, gestational diabetes, multiple gestations, fetal anomalies, previous cesarean delivery, or premature rupture of membranes were excluded. Additional exclusion criteria included known fetal congenital anomalies, chronic maternal diseases affecting amniotic fluid volume, or use of medications such as NSAIDs known to alter amniotic fluid levels. Written informed consent was obtained from all participants.

Upon recruitment, baseline demographic and clinical characteristics, including maternal age, gestational age, parity, gravidity, and body mass index (BMI), were recorded. BMI was calculated using the weight measured on a calibrated digital weighing scale and height using a stadiometer. The AFI was measured via ultrasound by a consultant radiologist, using the four-quadrant technique. Based on this, women were assigned to Group A (AFI ≤ 5 cm, oligohydramnios) or Group B (AFI > 5 cm, normal fluid volume).

Labor induction was recorded if performed due to a Bishop score less than six or upon reaching 42 weeks of gestation. Induction in women with an unfavorable cervix involved the use of prostaglandin E2, while those with a favorable cervix underwent induction with amniotomy and oxytocin infusion. Mode of delivery was categorized into spontaneous vaginal delivery, assisted vaginal delivery (using forceps or vacuum), and cesarean section (elective or emergency).

Neonatal outcomes assessed included birth weight, APGAR scores at 1 and 5 minutes, presence of meconium-stained liquor, intrauterine growth restriction (IUGR), NICU admission, and neonatal death within 28 days. Birth weight was measured using a calibrated electronic neonatal scale, with low birth weight defined as <2500 grams. A neonatologist assessed APGAR scores, and a score <7 at 5 minutes was considered suboptimal. IUGR was diagnosed via serial ultrasound biometry, defined as fetal femur length below the 10th percentile for gestational age. Meconium-stained liquor was recorded at delivery. NICU admissions were documented with duration of stay, and any neonatal death within the neonatal period was noted.

All data were entered into SPSS version 26. Descriptive statistics such as mean and standard deviation were computed for continuous variables, while categorical variables were expressed as frequencies and percentages. Associations between AFI groups and categorical outcomes (e.g., labor induction, mode of delivery, neonatal complications) were evaluated using Chi-square tests or Fisher's exact tests, where appropriate. Relative risks (RR) and their corresponding 95% confidence intervals were calculated to determine the strength of associations between oligohydramnios and adverse outcomes. A p-value of <0.05 was considered statistically significant. Subgroup analyses were planned to assess effect modification by maternal age, gestational age, parity, and BMI.

Results

A total of 112 pregnant women were included in this prospective cohort study, with 56 patients in each group: Group A (AFI ≤ 5 cm) representing the oligohydramnios group and Group B (AFI > 5 cm) as the control group. The mean age of participants in Group A was 27.32 ± 4.6 years, while in Group B it was 26.85 ± 5.1 years. The average gestational age at presentation was 38.6 ± 1.1 weeks in Group A and 38.9 ± 1.0 weeks in Group B. The mean BMI was 26.2 ± 3.4 kg/m² in Group A and 25.9 ± 3.2 kg/m² in Group B. Demographic distribution is detailed in Table 1.

Table 1: Demographic Characteristics of Study Population (n = 112)

Variable	Group A (AFI ≤ 5 cm) (n = 56)	Group B (AFI > 5 cm) (n = 56)	p-value
Mean Age (years)	27.32 ± 4.6	26.85 ± 5.1	0.58
Gestational Age (weeks)	38.6 ± 1.1	38.9 ± 1.0	0.21
BMI (kg/m²)	26.2 ± 3.4	25.9 ± 3.2	0.67
Nulliparous (%)	24 (42.9%)	22 (39.3%)	0.70
Multiparous (%)	32 (57.1%)	34 (60.7%)	

Table 1 shows no statistically significant difference between the groups in terms of baseline demographic and clinical characteristics.

Table 2: Comparison of Labor Induction and Mode of Delivery Between Groups

Variable	Group A (AFI ≤ 5 cm)	Group B (AFI > 5 cm)	p-value
Labor Induction (%)	30 (53.6%)	17 (30.4%)	0.01*
Vaginal Delivery (%)	22 (39.3%)	38 (67.9%)	0.002*
C-Section (%)	34 (60.7%)	18 (32.1%)	

Labor induction and cesarean section rates were significantly higher in the oligohydramnios group ($p < 0.05$).

Table 3: Neonatal Outcomes Between Groups

Outcome	Group A (AFI ≤ 5 cm)	Group B (AFI > 5 cm)	p-value
Low Birth Weight (<2500g)	18 (32.1%)	6 (10.7%)	0.005*
APGAR Score < 7 at 5 min	10 (17.9%)	3 (5.4%)	0.04*
Meconium-Stained Liquor	14 (25.0%)	4 (7.1%)	0.01*
IUGR Diagnosed	13 (23.2%)	4 (7.1%)	0.02*
NICU Admission	12 (21.4%)	3 (5.4%)	0.01*
Neonatal Death (within 28 days)	2 (3.6%)	0 (0.0%)	0.15

Table 3 shows a significantly higher rate of adverse neonatal outcomes, including low birth weight, lower APGAR scores, meconium staining, IUGR, and NICU admissions in Group A.

Table 4: Relative Risk (RR) of Adverse Fetomaternal Outcomes Associated with Oligohydramnios (AFI ≤ 5 cm)

Outcome	RR Calculation (Event Rate A / Event Rate B)	Relative Risk (RR)
Labor Induction	(30 / 56) ÷ (17 / 56)	1.76
Cesarean Delivery	(34 / 56) ÷ (18 / 56)	1.89
Low Birth Weight (<2500g)	(18 / 56) ÷ (6 / 56)	3.00
APGAR Score < 7 at 5 minutes	(10 / 56) ÷ (3 / 56)	3.33
Meconium-Stained Liquor	(14 / 56) ÷ (4 / 56)	3.50
Intrauterine Growth Restriction	(13 / 56) ÷ (4 / 56)	3.27
NICU Admission	(12 / 56) ÷ (3 / 56)	3.96
Neonatal Death	RR not defined (2 / 56 vs. 0 / 56)	—

Table 4 summarizes the relative risk (RR) of adverse fetomaternal outcomes associated with oligohydramnios (AFI ≤ 5 cm) compared to normal AFI (> 5 cm). The findings indicate significantly increased risks across all major outcomes in the oligohydramnios group. The highest RR was observed for NICU admission (3.96), followed by meconium-stained liquor (3.50), low APGAR score at 5 minutes (3.33), and intrauterine growth restriction (3.27). Cesarean delivery and labor induction also showed elevated risks (RR = 1.89 and 1.76, respectively). Relative risk for neonatal death could not be calculated due to zero events in the control group. These results highlight oligohydramnios as a strong predictor of adverse perinatal outcomes.

Discussion

The study evaluated the fetomaternal outcomes associated with oligohydramnios in a cohort of 112 pregnant women, demonstrating significant disparities in obstetric and neonatal outcomes when comparing women with an amniotic fluid index (AFI) of ≤5 cm to those with an AFI >5 cm. The results indicate that oligohydramnios is associated with increased risks for adverse maternal and neonatal outcomes, corroborating findings in the existing literature, such as those described by Madazlı and Figueroa et al. (10, 1).

In our study, a substantial proportion of women with oligohydramnios (Group A) experienced labor induction (53.6%) and cesarean delivery (60.7%), showing significant differences compared to the control group (30.4% for labor induction and 32.1% for cesarean delivery, $p < 0.05$). This is consistent with studies that associate oligohydramnios with higher rates of labor inductions and cesarean sections due to fetal distress and other complications (11, 12). Additionally, a meta-analysis indicated that isolated oligohydramnios is linked to higher rates of cesarean delivery, particularly due to fetal distress (13). Our findings support the integration of careful fetal surveillance and timely interventions in management protocols for cases diagnosed with oligohydramnios.

Neonatal outcomes were significantly poorer in the oligohydramnios group, with notable findings including low birth weight (32.1% in Group A vs. 10.7% in Group B), lower APGAR scores (<7 at 5 minutes) (17.9% vs. 5.4%), increased rates of Intrauterine Growth Restriction (IUGR) (23.2% vs. 7.1%), and NICU admissions (21.4% vs. 5.4%). These results align with various studies indicating that oligohydramnios is a critical risk factor for adverse neonatal outcomes, including lower birth weight and higher NICU admission rates (14, 15). Our relative risk calculations emphasize that neonates from pregnancies complicated by oligohydramnios are at a heightened risk for several adverse outcomes, reinforcing the need for stringent monitoring and possible early intervention.

Furthermore, our research supports previous literature identifying relationships between oligohydramnios and complications such as meconium-stained amniotic fluid, with 25% of the oligohydramnios group experiencing this complication compared to only 7.1% in the control group. Similar associations have been observed in other studies (16, 12). This highlights the importance of monitoring for meconium-stained fluid and its implications as part of the clinical management strategy aimed at improving fetomaternal outcomes.

In contrast to some recent studies suggesting that isolated oligohydramnios may not significantly affect perinatal outcomes when closely monitored (13), our data reflect that the presence of complications still necessitates proactive management. This discrepancy underscores the variability in outcomes and highlights the significance of local context and management protocols in addressing oligohydramnios in term pregnancies.

Thus, this study strengthens the existing evidence linking oligohydramnios with adverse fetomaternal outcomes, underscoring the need for careful monitoring and potential early intervention. The relative risks identified in our findings present a compelling case for obstetricians in Pakistan and beyond to refine clinical guidelines to enhance pregnancy outcomes in light of these findings.

Conclusion

This study highlights oligohydramnios as a significant predictor of adverse fetomaternal outcomes in uncomplicated term pregnancies. The increased risks of labor induction, cesarean delivery, low birth weight, APGAR scores <7, meconium-stained amniotic fluid, IUGR, and NICU admissions in the oligohydramnios group support the need for early detection and vigilant antenatal surveillance. In the context of Pakistan's healthcare infrastructure, where resource limitations and late antenatal booking are prevalent, implementing strict monitoring protocols and standardized clinical management pathways for pregnancies complicated by oligohydramnios is essential. These measures can help mitigate perinatal morbidity and enhance the overall quality of obstetric care.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned.

Consent for publication

Approved

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The authors declared the absence of a conflict of interest.

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Study Design, manuscript review, critical input.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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