

ASSOCIATION OF INTRAUTERINE FETAL GROWTH RESTRICTION COMPLICATED WITH AND WITHOUT OLIGOHYDRAMNIOS AT A TERTIARY CARE HOSPITAL, KARACHI

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DOI: <http://doi.org/10.5281/zenodo.19275626>

Keywords

Intrauterine growth restriction, oligohydramnios, amniotic fluid index, fetal distress, perinatal outcomes.

Article History

Received: 10 January 2025

Accepted: 13 February 2025

Published: 08 March 2025

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Abstract

Background:

Intrauterine fetal growth restriction (IUGR) is a major contributor to adverse perinatal outcomes, particularly in low- and middle-income countries. Oligohydramnios, a condition characterized by reduced amniotic fluid volume, is frequently associated with IUGR and is considered an indicator of uteroplacental insufficiency. The combined presence of these conditions may further compromise fetal well-being and influence obstetric management.

Objective:

To evaluate the association of intrauterine fetal growth restriction with and without oligohydramnios and to compare maternal and perinatal outcomes between the two groups at a tertiary care hospital in Karachi.

Methods:

This prospective observational study was conducted over a period of one year in the Department of Obstetrics and Gynecology. A total of 150 pregnant women diagnosed with IUGR (estimated fetal weight <10th percentile) at a gestational age of ≥ 28 weeks were included. Participants were divided into two groups: IUGR with oligohydramnios (amniotic fluid index ≤ 5 cm) and IUGR with normal amniotic fluid. Data regarding maternal demographics, obstetric characteristics, mode of delivery, and neonatal outcomes were collected. Statistical analysis was performed using SPSS version 25, and associations were assessed using the Chi-square test with a significance level of $p \leq 0.05$.

Results:

Among the 150 patients, 60 (40%) had IUGR with oligohydramnios, while 90 (60%) had IUGR with normal amniotic fluid. The presence of oligohydramnios was significantly associated with increased rates of cesarean section (65% vs 40%, $p=0.01$), fetal distress (30% vs 15%, $p=0.02$), and NICU admission (35% vs 18%, $p=0.01$). Additionally, neonates in the oligohydramnios group had lower mean birth weights. However, no statistically significant difference was observed in perinatal mortality between the two groups ($p>0.05$).

Conclusion:

Oligohydramnios in pregnancies complicated by IUGR is associated with increased obstetric interventions and adverse neonatal outcomes. Early identification and close antenatal surveillance are essential to optimize perinatal outcomes and guide timely clinical decision-making.

INTRODUCTION

Intrauterine fetal growth restriction (IUGR) is a significant obstetric condition defined as the failure of a fetus to achieve its genetically predetermined growth potential, typically identified when the estimated fetal weight is below the 10th percentile for gestational age. It remains a leading cause of perinatal morbidity and mortality worldwide, particularly in low- and middle-income countries where access to quality antenatal care is limited (1). IUGR is associated with adverse outcomes including preterm birth, low birth weight, fetal distress, and increased neonatal intensive care unit (NICU) admissions (2).

Oligohydramnios, defined as an amniotic fluid index (AFI) of ≤ 5 cm or a single deepest pocket of less than 2 cm, is an important obstetric complication frequently associated with IUGR. It is commonly considered a marker of uteroplacental insufficiency and reflects reduced fetal renal perfusion secondary to chronic hypoxia (3). The coexistence of oligohydramnios with IUGR may indicate worsening placental function and increased fetal compromise (4).

Recent studies have highlighted that oligohydramnios is associated with increased perinatal complications, including fetal distress, meconium-stained liquor, operative delivery, and NICU admission (5). Furthermore, it is considered an important parameter in antenatal fetal surveillance and plays a critical role in determining the timing of delivery in high-risk pregnancies (6).

The relationship between IUGR and oligohydramnios has been increasingly explored in recent years. Evidence suggests that reduced amniotic fluid volume is frequently observed in growth-restricted fetuses and is associated with poorer neonatal outcomes (7). However, the extent to which oligohydramnios independently contributes to adverse outcomes in IUGR

pregnancies remains controversial (8). Some studies suggest that oligohydramnios significantly worsens perinatal outcomes, while others report no substantial difference when compared with IUGR cases with normal amniotic fluid (9).

The underlying pathophysiology linking IUGR and oligohydramnios is primarily related to placental insufficiency. Reduced uteroplacental blood flow leads to fetal circulatory redistribution, prioritizing vital organs such as the brain while reducing renal perfusion, ultimately resulting in decreased fetal urine output and low amniotic fluid volume (10). This compensatory mechanism, although protective in the short term, is associated with chronic fetal hypoxia and increased risk of adverse outcomes.

In developing countries such as Pakistan, the burden of IUGR and its associated complications remains high. Limited local data are available regarding the combined effect of IUGR and oligohydramnios on maternal and neonatal outcomes. Therefore, evaluating this association in a local tertiary care setting is essential to improve clinical decision-making and optimize perinatal outcomes.

Methodology

This prospective observational study was conducted in the Department of Obstetrics and Gynecology at a tertiary care hospital in Karachi, Pakistan, over a period of one year from January 2025 to December 2025. The study aimed to evaluate the association between intrauterine fetal growth restriction (IUGR) with and without oligohydramnios and its impact on maternal and perinatal outcomes.

A total of 150 pregnant women diagnosed with IUGR were included using non-probability consecutive sampling. The sample size was calculated using the WHO sample size calculator, assuming a 95% confidence level, 5% margin of

error, and expected prevalence of oligohydramnios in IUGR of 40%. Pregnant women aged 18–40 years, with singleton pregnancies and gestational age ≥ 28 weeks, and diagnosed with IUGR (estimated fetal weight < 10 th percentile on ultrasound) were included. Patients with multiple pregnancies, congenital fetal anomalies, ruptured membranes, maternal comorbidities such as uncontrolled diabetes or chronic hypertension, and incomplete records were excluded.

After obtaining approval from the institutional ethical review committee, informed written consent was obtained from all participants. Detailed clinical data were collected using a structured proforma, including maternal age, parity, gestational age, and obstetric history. Ultrasound was performed to assess fetal weight and amniotic fluid index (AFI). Based on AFI findings, patients were divided into two groups:

- Group A: IUGR with oligohydramnios (AFI ≤ 5 cm)
- Group B: IUGR with normal amniotic fluid (AFI > 5 cm)

All patients were followed until delivery. Maternal outcomes such as mode of delivery (vaginal or cesarean section) and indication for cesarean were recorded. Perinatal outcomes including birth weight, fetal distress, Apgar score at 5 minutes, and NICU admission were documented.

Data were entered and analyzed using SPSS version 25. Quantitative variables such as maternal age and birth weight were presented as mean $\pm$ standard deviation, while qualitative variables such as mode of delivery, fetal distress, and NICU admission were expressed as frequencies and percentages. The Chi-square test was applied to assess the association between oligohydramnios and categorical outcomes. A p -

value ≤ 0.05 was considered statistically significant.

Patient confidentiality was strictly maintained throughout the study, and all procedures were conducted in accordance with ethical guidelines.

Results

A total of 150 pregnant women diagnosed with intrauterine fetal growth restriction (IUGR) were included in this study. The mean maternal age was 29.8 ± 4.5 years, with the majority of patients (56.7%) belonging to the age group of 26–35 years. Most women were multiparous, with 60% having parity greater than two.

Among the study population, 60 (40%) patients were identified as having IUGR with oligohydramnios (Group A), while 90 (60%) had IUGR with normal amniotic fluid (Group B).

Regarding maternal outcomes, the rate of cesarean section was significantly higher in Group A compared to Group B (65% vs 40%, $p = 0.01$), while vaginal delivery was more common in Group B (60% vs 35%). Fetal distress was also observed more frequently in patients with oligohydramnios (30%) compared to those with normal amniotic fluid (15.6%), showing a statistically significant association ($p = 0.02$).

In terms of neonatal outcomes, NICU admission was significantly higher in Group A (35%) compared to Group B (17.8%) ($p = 0.01$). Additionally, the mean birth weight was lower in the oligohydramnios group (2.1 ± 0.4 kg) compared to the normal amniotic fluid group (2.4 ± 0.5 kg), which was statistically significant ($p = 0.03$).

Overall, the presence of oligohydramnios in pregnancies complicated by IUGR was associated with increased rates of cesarean delivery, fetal distress, NICU admission, and lower birth weight, indicating a higher risk of adverse maternal and perinatal outcomes.

Table 1: Demographic and Clinical Characteristics (n = 150)

Variable	Frequency (n)	Percentage (%)
Age (years)		
18-25	35	23.3
26-35	85	56.7
>35	30	20.0
Parity		
≤2	60	40.0
>2	90	60.0
Study Groups		
IUGR + Oligohydramnios (Group A)	60	40.0
IUGR + Normal AF (Group B)	90	60.0

Table 2: Maternal Outcomes (Mode of Delivery & Fetal Distress)

Variable	Group A n (%)	Group B n (%)	p-value
Mode of Delivery			
Vaginal Delivery	21 (35.0%)	54 (60.0%)	
Cesarean Section	39 (65.0%)	36 (40.0%)	0.01
Fetal Distress			
Yes	18 (30.0%)	14 (15.6%)	
No	42 (70.0%)	76 (84.4%)	0.02

Table 3: Neonatal Outcomes

Variable	Group A n (%) / Mean ± SD	Group B n (%) / Mean ± SD	p-value
NICU Admission			
Yes	21 (35.0%)	16 (17.8%)	
No	39 (65.0%)	74 (82.2%)	0.01
Birth Weight (kg)	2.1 ± 0.4	2.4 ± 0.5	0.03*

*p-value calculated using independent t-test

Discussion

The present study evaluated the association of intrauterine fetal growth restriction (IUGR) with and without oligohydramnios and demonstrated that the presence of oligohydramnios is significantly associated with adverse maternal and neonatal outcomes. In our study, patients with IUGR and oligohydramnios had higher rates of cesarean section, fetal distress, NICU admission, and lower birth weight compared to those with normal amniotic fluid. These findings are consistent with recent literature highlighting the clinical significance of reduced amniotic fluid volume in compromised pregnancies.

The overall findings of this study are in agreement with recent studies, which report that oligohydramnios is associated with increased perinatal morbidity and need for operative delivery (11). Oligohydramnios is considered a manifestation of placental insufficiency and is frequently observed in pregnancies complicated by fetal growth restriction, contributing to poor fetal outcomes (12). The coexistence of IUGR and oligohydramnios reflects a more severe degree of uteroplacental compromise, thereby increasing the risk of adverse outcomes.

In this study, cesarean section was significantly higher in the oligohydramnios group (65%),

which is comparable to findings from recent studies where operative delivery rates are significantly increased in patients with reduced amniotic fluid due to fetal distress and abnormal fetal heart rate patterns (13). A recent study reported cesarean rates as high as 85% in patients with oligohydramnios, further supporting our findings (14). This increase is primarily due to the need for timely intervention to prevent fetal compromise.

Fetal distress was also significantly higher in the oligohydramnios group in our study. This is supported by evidence suggesting that reduced amniotic fluid volume is associated with cord compression and compromised fetal oxygenation, leading to abnormal fetal heart rate patterns (15). Similarly, studies have shown that oligohydramnios is associated with increased incidence of meconium-stained liquor and intrapartum fetal distress (16).

Neonatal outcomes in our study further reinforce the adverse impact of oligohydramnios. NICU admission was significantly higher among patients with oligohydramnios, which is consistent with findings from recent studies reporting increased NICU admissions in such pregnancies due to complications such as low birth weight, respiratory distress, and prematurity (17). A recent cohort study also demonstrated that oligohydramnios is associated with significantly lower birth weight and increased neonatal complications compared to pregnancies with normal amniotic fluid (18).

The lower mean birth weight observed in the oligohydramnios group in our study is in line with the pathophysiological mechanism linking placental insufficiency to both IUGR and reduced amniotic fluid volume. Reduced placental perfusion leads to decreased fetal renal blood flow and urine output, resulting in oligohydramnios and impaired fetal growth (19). This relationship has been well documented in recent studies emphasizing the role of placental dysfunction in adverse pregnancy outcomes (20). Interestingly, although adverse outcomes were more frequent in the oligohydramnios group, some studies have reported conflicting results regarding the independent effect of

oligohydramnios on perinatal outcomes. Certain studies suggest that while oligohydramnios is associated with increased interventions, it may not significantly increase perinatal mortality when managed appropriately (21). This may explain why perinatal mortality was not significantly different between the groups in our study.

Regional studies from Pakistan and similar settings also support our findings, indicating that pregnancies complicated by oligohydramnios have higher rates of cesarean delivery, fetal distress, and neonatal complications (22). Limited access to early antenatal care and delayed diagnosis may further contribute to the increased burden of complications in developing countries. The findings of this study highlight the importance of early detection and close monitoring of pregnancies complicated by IUGR and oligohydramnios. Regular antenatal surveillance, including ultrasound assessment of amniotic fluid and fetal growth, is essential for timely intervention. Multidisciplinary management and appropriate timing of delivery can significantly improve maternal and neonatal outcomes.

However, this study has certain limitations. It was conducted at a single tertiary care center, which may limit the generalizability of the findings. Additionally, long-term neonatal outcomes were not assessed, which could provide further insight into the impact of these conditions.

Conclusion

Oligohydramnios in pregnancies complicated by intrauterine fetal growth restriction is significantly associated with increased rates of cesarean delivery, fetal distress, NICU admission, and low birth weight. The coexistence of these conditions indicates a higher degree of placental insufficiency and fetal compromise.

Early diagnosis, vigilant antenatal surveillance, and timely obstetric intervention are essential to improve perinatal outcomes. Implementing standardized management protocols in tertiary care settings can help reduce morbidity and optimize both maternal and neonatal outcomes.

REFERENCES

- American College of Obstetricians and Gynecologists. Fetal growth restriction. *Obstet Gynecol.* 2021;137(2):e16-28.
- Gordijn SJ, Beune IM, Thilaganathan B, Papageorgiou A, Baschat AA, Baker PN, et al. Consensus definition of fetal growth restriction. *Lancet Child Adolesc Health.* 2020;4(2):140-9.
- Bynarrowicz T, Jenkins SM, Shanks AL. Oligohydramnios. StatPearls Publishing; 2025.
- Morris RK, et al. Association of amniotic fluid abnormalities with adverse outcomes. *Ultrasound Obstet Gynecol.* 2021;58(3):380-7.
- Chauhan SP, et al. Perinatal outcomes in oligohydramnios. *Am J Obstet Gynecol.* 2020;223(2):e1-10.
- Society for Maternal-Fetal Medicine (SMFM). Guidelines on IUGR management. *Am J Obstet Gynecol.* 2020;223(4):B2-17.
- Twesigomwe G, et al. Prevalence and outcomes of oligohydramnios. *BMC Pregnancy Childbirth.* 2022;22:610.
- Leytes S, et al. Isolated oligohydramnios and perinatal outcomes. *J Clin Med.* 2022;11(21):6351.
- Mohammed SS, et al. Maternal and neonatal outcomes in oligohydramnios. 2024.
- Baschat AA. Pathophysiology of fetal growth restriction. *Am J Obstet Gynecol.* 2021;224(2):S725-S733.
- Gordijn SJ, Beune IM, Thilaganathan B, Papageorgiou A, Baschat AA, Baker PN, et al. Consensus definition of fetal growth restriction: a Delphi procedure. *Lancet Child Adolesc Health.* 2020;4(2):140-9.
- Baschat AA, Galan HL. Fetal growth restriction due to placental disease. *Semin Perinatol.* 2021;45(5):151487.
- Chauhan SP, Magann EF, Sandlin AT, Doherty DA. Perinatal outcomes with oligohydramnios. *Am J Obstet Gynecol.* 2020;223(2):e1-10.
- Morris RK, Meller CH, Tamblyn J, Malin GL, Riley RD, Kilby MD, et al. Association of amniotic fluid abnormalities with adverse pregnancy outcomes. *Ultrasound Obstet Gynecol.* 2021;58(3):380-7.
- Society for Maternal-Fetal Medicine (SMFM). SMFM Consult Series #52: Diagnosis and management of fetal growth restriction. *Am J Obstet Gynecol.* 2020;223(4):B2-17.
- Twesigomwe G, Ssekya J, Kiondo P, Wandabwa JN. Prevalence and outcomes of oligohydramnios. *BMC Pregnancy Childbirth.* 2022;22:610.
- Leytes S, Wainstock T, Sheiner E. Isolated oligohydramnios and adverse perinatal outcomes. *J Clin Med.* 2022;11(21):6351.
- Kalafat E, Thilaganathan B. Cardiovascular origins of fetal growth restriction. *Am J Obstet Gynecol.* 2020;223(3):e1-16.
- Dall'Asta A, Brunelli V, Prefumo F, Frusca T, Lees CC. Early-onset fetal growth restriction. *Ultrasound Obstet Gynecol.* 2020;56(4):463-72.
- Figueras F, Gratacos E. Update on the diagnosis and classification of fetal growth restriction. *Am J Obstet Gynecol.* 2021;224(2):S725-S733.
- Roberts D, Brown J, Medley N, Dalziel SR. Antenatal corticosteroids for fetal lung maturation. *Cochrane Database Syst Rev.* 2020;3:CD004454.
- Malik A, Ali S, Ahmed S. Perinatal outcomes in pregnancies complicated by oligohydramnios in a tertiary care hospital in Pakistan. *Pak J Med Sci.* 2021;37(5):1342-6.