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Fetomaternal outcomes in Oligohydramnios during Second and Third Trimester of Pregnancy

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ABSTRACT

Background: Oligohydramnios, or decreased amniotic fluid index, has been linked with an entire continuum of poor outcomes in pregnancy. Early identification and management are very important, since it also places the mother and fetus at higher risks. It has been strongly associated with fetal compromise, abnormal presentations, premature delivery, and adverse neonatal outcomes. **Objective:** To determine the frequency of fetomaternal outcomes in oligohydramnios during second and third trimester of pregnancy. **Study Design:** Descriptive Cross-Sectional study. **Duration and Place of Study:** The study was conducted from January 2024 to June 2024 in the Department of Obstetrics and Gynaecology, Lady Reading Hospital, Peshawar. **Methodology:** A total of 101 women aged 18–40 years with singleton pregnancies beyond 13 weeks and diagnosed with oligohydramnios (amniotic fluid index ≤5 cm) were enrolled through consecutive sampling. Women with systemic disorders were excluded. Demographic and clinical details were documented, and patients were followed until delivery. Fetomaternal outcomes included caesarean section, fetal distress, malpresentation, fetal structural anomalies, intrauterine fetal death, prematurity, meconium aspiration syndrome, low birth weight, respiratory distress, early neonatal death, and need for neonatal intensive care. **Results:** The mean maternal age was 29.99±6.85 years and mean gestational age 26.72±7.28 weeks. Caesarean section occurred in 44.6% of cases, prematurity in 15.8%, and intrauterine fetal death in 7.9%. Neonatal complications included low birth weight (38.6%), respiratory distress (30.7%), NICU admission (32.7%), and meconium aspiration (11.9%). **Conclusion:** Oligohydramnios is strongly associated with adverse fetomaternal outcomes, underscoring the importance of close monitoring and timely intervention to improve prognosis.

INTRODUCTION

Oligohydramnios, or reduced volumes of amniotic fluid, is the disorder most frequently identified in the second and third trimesters of gestation.[1] Amniotic fluid plays a critical role in the development and maturation of the fetus, providing mechanical defense, permitting free movement of the fetus, and promoting lung maturation.[2] Deficiency of the fluid tends to indicate maternal, placental, or fetal disease and is accompanied by serious danger to the perinatal interval.[3] Screening examinations such as the amniotic fluid index or single deepest pocket are routinely performed to identify this disorder and also guide appropriate obstetric management.[4]

The development of oligohydramnios during later gestation has been strongly linked with unfavorable fetomaternal outcomes. Patients with the condition are often necessitating caesarean section either due to non-reassuring fetal heart or due to obstructed labor secondary to cord compression.[5] Incidence of meconium-stained amniotic fluid and thus, subsequent meconium aspiration syndrome is significantly higher, and neonates are at high risks of respiratory compromise at birth.[6] Small intrauterine environment also usually converts into intrauterine growth restriction and low birth weight, with long-term repercussions on neonatal survival and well-being.[7]

Neonatal respiratory distress syndrome is also the classic complication, more common among neonates born prematurely or individuals with prolonged oligohydramnios that affects lung maturation.[8] Amniotic fluid reduction suppresses fetal breathing movements and lung maturation, increasing the likelihood of needing neonatal ventilatory support at delivery.[9] Intrauterine fetal loss is also still a serious issue, more importantly if oligohydramnios is further compounded with placental insufficiency or congenital malformations.[10] These complications highlight the severe need for monitoring and timely obstetric intervention in an effort to obviate maternal and perinatal morbidity and mortality resulting from this high-risk disorder.[11]

Talesara H et al. reported that in pregnancies complicated by oligohydramnios during the second and

third trimesters, the frequency of caesarean section was 43%, meconium aspiration syndrome occurred in 12% of cases, low birth weight was observed in 39%, respiratory distress in 30%, and intrauterine fetal death in 7%.[12]

Oligohydramnios remains an important cause of poor pregnancy outcomes, but population-specific data on Peshawar are limited. Variations across geographic regions in the health of the mother, practices related to antenatal care, and access to prompt obstetric intervention affect both the occurrence and severity of fetomaternal issues. Carrying out this work in Peshawar will generate locally relevant information to clarify the burden of oligohydramnios and its outcomes and thus help clinicians incorporate more effective monitoring practices and enhance perinatal care in this healthcare context.

METHODOLOGY

This descriptive study was carried out in the Department of Obstetrics and Gynaecology at Lady Reading Hospital, Peshawar, spanning from January 2024 to June 2024. A total of 101 participants were enrolled. The sample size was estimated using the World Health Organization software, considering a 95% confidence interval, a 5% margin of error, and an anticipated intrauterine fetal death frequency of 7% in pregnancies complicated by oligohydramnios during the second and third trimesters.[12] A non-probability consecutive sampling method was employed.

Approval for the study was obtained from the institutional ethics review committee before the commencement of data collection. Women between 18 and 40 years of age with singleton pregnancies beyond 13 weeks of gestation, irrespective of parity, and diagnosed with oligohydramnios on ultrasound were included. Patients with pre-existing systemic disorders such as renal or hepatic disease, diabetes, hypertension, or those who declined participation were excluded. Informed consent was obtained from each eligible participant prior to enrollment, ensuring confidentiality and voluntary participation.

Baseline demographic details including age, parity, gestational age based on the last menstrual period, and amniotic fluid index were documented. Each patient underwent routine antenatal evaluation followed by monitoring until delivery. Oligohydramnios was confirmed when the amniotic fluid index measured ≤5.0 cm on ultrasound. Fetomaternal outcomes were assessed during follow-up: fetal distress was identified by abnormal heart rate patterns (>160 beats/minute or <120 beats/minute) on auscultation or electronic fetal monitoring; fetal malpresentation was noted when any non-vertex position was observed on ultrasound; structural anomalies such as congenital heart defects, cleft lip, spina bifida, or limb malformations were recorded; intrauterine fetal death was diagnosed by the absence of cardiac activity on ultrasound; prematurity was defined as delivery between 24 and 36 weeks of gestation; and caesarean section was performed for standard obstetric indications, particularly fetal compromise. Neonatal outcomes were further evaluated—meconium aspiration syndrome was diagnosed based on characteristic chest sounds, radiographic findings, or both; respiratory distress was identified when Downe's score ranged between 3–6 with oxygen requirements below 0.6 or with recurrent apnoea not requiring resuscitation; low birth weight was classified as <2500 g on calibrated weighing machines; early neonatal death referred to mortality within 24 hours of birth; and the requirement for neonatal intensive care was noted when admission was deemed necessary for clinical stabilization.

Data were entered and analyzed using IBM SPSS version 26. Quantitative variables such as maternal age, gestational age, parity, and amniotic fluid index were described as mean ± standard deviation. Categorical variables included caesarean section, fetal distress, fetal malpresentation, fetal structural anomalies, intrauterine fetal death, prematurity, meconium aspiration syndrome, respiratory distress, low birth weight, early neonatal death, and need for neonatal intensive care. Frequencies and percentages were computed for each outcome. Stratification was undertaken for maternal age, parity, gestational age, and amniotic fluid index to observe variations in results. The chi-square test was applied for post-stratification comparisons, with a p-value of ≤0.05 considered statistically significant.

RESULTS

The patient demographics revealed a mean maternal age of 29.99±6.85 years, mean gestational age of 26.72±7.28 weeks, mean parity of 3.01±1.60, and mean amniotic fluid index (AFI) level of 3.01±0.77 cm (as shown in Table I).

Table I

Patient Demographics (n=101)

Demographics	Mean ± SD
Age (years)	29.99±6.85
Gestational Age (weeks)	26.72±7.28
Parity	3.01±1.60
AFI level (cm)	3.01±0.77

The frequency analysis of fetomaternal outcomes demonstrated that fetal distress occurred in 14 patients (13.90%), fetal structural anomalies in 4 patients (4.00%), malpresentation in 10 patients (9.90%), and intrauterine fetal death in 8 patients (7.90%). Delivery outcomes showed that caesarean section was performed in 45 patients (44.60%) and prematurity occurred in 16 patients (15.80%). Neonatal complications included early neonatal death in 2 patients (2.00%), meconium aspiration in 12 patients (11.90%), low birth weight in 39 patients (38.60%), respiratory distress in 31 patients (30.70%), and need for NICU admission in 33 patients (32.70%) (as shown in Table II).

Table II

Frequency of Fetomaternal Outcomes in Oligohydramnios

Fetomaternal Outcomes	Frequency	Percentage
Fetal Distress		
Yes	14	13.90%
No	87	86.10%
Fetal Structural Anomalies		
Yes	4	4.00%
No	97	96.00%
Malpresentation		
Yes	10	9.90%
No	91	90.10%
Intrauterine Fetal Death		
Yes	8	7.90%

No	93	92.10%
Caesarean Section		
Yes	45	44.60%
No	56	55.40%
Prematurity		
Yes	16	15.80%
No	85	84.20%
Early Neonatal Death		
Yes	2	2.00%
No	99	98.00%
Meconium Aspiration		
Yes	12	11.90%
No	89	88.10%
Low Birth Weight		
Yes	39	38.60%
No	62	61.40%
Respiratory Distress		
Yes	31	30.70%
No	70	69.30%
Need for NICU Admission		
Yes	33	32.70%
No	68	67.30%

The stratified analysis by demographic factors revealed several statistically significant associations. Maternal age greater than 30 years was significantly associated with increased rates of malpresentation (16.3% vs 3.8%, p=0.047), caesarean section (59.2% vs 30.8%, p=0.004), prematurity (24.5% vs 7.7%, p=0.029), and need for NICU admission (42.9% vs 23.1%, p=0.034). Gestational age ≤30 weeks was significantly associated with lower rates of fetal structural anomalies (0.0% vs 12.9%, p=0.008), higher rates of malpresentation (14.3% vs 0.0%, p=0.029), and increased caesarean section rates (54.3% vs 22.6%, p=0.003). Parity >3 was significantly associated with increased malpresentation (20.5% vs 3.2%, p=0.007), prematurity (25.6% vs 9.7%, p=0.032), and low birth weight (53.8% vs 29.0%, p=0.013). Finally, AFI level >3 cm was significantly associated with reduced prematurity rates (4.7% vs 24.1%, p=0.011) compared to AFI ≤3 cm (as shown in Table III).

Table III

Association of Demographic Factors with Fetomaternal Outcomes

Demographic Factors		Fetal Distress	Fetal Structural Anomalies	Malpresentation	Intrauterine Fetal Death	Caesarean Section	Prematurity	Early Neonatal Death	Meconium Aspiration	Low Birth Weight	Respiratory Distress	Need for NICU Admission
Age (years)	≤30	8 (15.4%)	4 (7.7%)	2 (3.8%)	4 (7.7%)	16 (30.8%)	4 (7.7%)	0 (0.0%)	4 (7.7%)	20 (38.5%)	12 (23.1%)	12 (23.1%)
	>30	6 (12.2%)	0 (0.0%)	8 (16.3%)	4 (8.2%)	29 (59.2%)	12 (24.5%)	2 (4.1%)	8 (16.3%)	19 (38.8%)	19 (38.8%)	21 (42.9%)
p-value		0.648	0.118	0.047*	1.000	0.004*	0.029*	0.233	0.226	0.974	0.087	0.034*
Gestational Age (weeks)	≤30	10 (14.3%)	0 (0.0%)	10 (14.3%)	4 (5.7%)	38 (54.3%)	12 (17.1%)	2 (2.9%)	8 (11.4%)	28 (40.0%)	22 (31.4%)	24 (34.3%)
	>30	4 (12.9%)	4 (12.9%)	0 (0.0%)	4 (12.9%)	7 (22.6%)	4 (12.9%)	0 (0.0%)	4 (12.9%)	11 (35.5%)	9 (29.0%)	9 (29.0%)
p-value		1.000	0.008*	0.029*	0.245	0.003*	0.770	0.570	1.000	0.667	0.810	0.604
Parity	≤3	10 (16.1%)	4 (6.5%)	2 (3.2%)	6 (9.7%)	24 (38.7%)	6 (9.7%)	0 (0.0%)	6 (9.7%)	18 (29.0%)	16 (25.8%)	16 (25.8%)
	>3	4 (10.3%)	0 (0.0%)	8 (20.5%)	2 (5.1%)	21 (53.8%)	10 (25.6%)	2 (5.1%)	6 (15.4%)	21 (53.8%)	15 (38.5%)	17 (43.6%)
p-value		0.557	0.157	0.007*	0.480	0.136	0.032*	0.147	0.388	0.013*	0.179	0.064
AFI Level (cm)	≤3	8 (13.8%)	4 (6.9%)	6 (10.3%)	2 (3.4%)	24 (41.4%)	14 (24.1%)	0 (0.0%)	6 (10.3%)	20 (34.5%)	18 (31.0%)	16 (27.6%)
	>3	6 (14.0%)	0 (0.0%)	4 (9.3%)	6 (14.0%)	21 (48.8%)	2 (4.7%)	2 (4.7%)	6 (14.0%)	19 (44.2%)	13 (30.2%)	17 (39.5%)
p-value		0.982	0.134	1.000	0.069	0.456	0.011*	0.179	0.579	0.322	0.931	0.206

***Statistically significant (p<0.05)**

DISCUSSION

The rate of fetal distress evident (13.90%) is due to the compromised amniotic fluid volume generating a pressive environment around the fetus, umbilical cord compression, and hence fetal hypoxia upon uterine contraction. The incidence of fetal structural anomalies (4.00%) mirrors the underlying pathophysiology where fetal congenital abnormalities, and more importantly, abnormalities in the fetal urinary system, tend to result in compromised amniotic fluid production. The higher rate of malpresentation (9.90%) exists since normal fetal movement and position depend on adequate amniotic fluid, and its absence confines fetal movement and does not allow ideal cephalic presentation. The incidence of intrauterine fetal demise of 7.90% indicates the severe implication of prolonged oligohydramnios where chronic compression and compromised fetal breathing movements ultimately affect fetal well-being. The higher caesarean delivery rate of 44.60% is accounted for due to the combination of fetal distress, malpresentation, and anticipation of umbilical cord compression during the process of labor, leading obstetricians to decide on operative delivery to enable fetal safety. Prematurity (15.80%) frequently occurs due to the underlying pathology leading to oligohydramnios or due to medical intervention necessary because of fetal compromise. The high rate of low birth weight (38.60%) and respiratory distress (30.70%) indicates the effects of compromised amniotic fluid on fetal development and lung maturation, since fetal breathing movements provided by amniotic fluid are necessary to ensure pulmonary maturation. Therefore, the high requirement for NICU admission of 32.70% being representative of the compounded effects of such complications that need neonatal monitoring and supportive care intricately.

The findings of the present study align with several previous investigations while revealing some notable differences that merit discussion. Our observed caesarean section rate of 44.60% is consistent with Alam K, et al. [13] who reported 46.58% and closely matches Talesara H, et al. [12] who found 43% caesarean delivery rates in oligohydramnios cases, supporting the established clinical practice of operative intervention when fetal compromise is anticipated. However, our rate was lower than Sultana M, et al. [14] who reported 80.9% caesarean sections in borderline oligohydramnios, which may be attributed to

their study focusing on third-trimester cases with more severe fluid deficiency and different clinical management protocols. The fetal distress rate of 13.90% in our study was comparable to the range observed in literature, though direct comparison is limited as most studies report this as an indication for caesarean section rather than an independent outcome. Our NICU admission rate of 32.70% was similar to Vidyasagar V, et al. [15] who reported 36.59% and Sultana M, et al. [14] who found 30.9%, reflecting the consistent need for intensive neonatal monitoring in oligohydramnios cases due to the high risk of respiratory and other complications.

The low birth weight incidence of 38.60% in our study was higher than Bashir S, et al. [16] who reported 22% at term, which can be explained by our inclusion of second trimester cases where intrauterine growth restriction is more pronounced due to prolonged oligohydramnios exposure. Our respiratory distress rate of 30.70% aligns closely with Talesara H, et al. [12] who reported exactly 30%, confirming that pulmonary hypoplasia secondary to oligohydramnios consistently affects approximately one-third of neonates regardless of geographical or institutional variations. The meconium aspiration rate of 11.90% in our study was comparable to Talesara H, et al. [12] who found 12%, but higher than Vidyasagar V, et al. [15] who reported 9.76%, suggesting that the degree of oligohydramnios and gestational age at delivery may influence this outcome. Our intrauterine fetal death rate of 7.90% was consistent with Talesara H, et al. [12] who reported 7%, indicating a relatively stable mortality pattern in oligohydramnios cases across different populations.

The significant association between maternal age >30 years and increased caesarean section rates (p=0.004) in our study reflects the clinical tendency toward more conservative management in older mothers with oligohydramnios, where the combination of advanced maternal age and reduced amniotic fluid creates a higher risk profile necessitating operative delivery. The significant relationship between gestational age ≤30 weeks and increased caesarean section rates (p=0.003) demonstrates that earlier gestational ages in oligohydramnios cases often require immediate delivery due to severe fetal compromise, overriding attempts at vaginal delivery. The significant association between AFI ≤3 cm and increased prematurity (p=0.011) supports the pathophysiological concept that more severe oligohydramnios necessitates earlier intervention to prevent further fetal deterioration, as demonstrated by the clinical practice of timing delivery based on amniotic fluid volume severity.

A number of limitations should be noted in the interpretation of these results. This was a single-center cohort at one tertiary academic medical center, and this may reduce generalizability of findings across different healthcare systems with varying patient populations, clinical practices, and available resources. The sample size of just 101 patients may have been small enough to reduce statistical power and hence the ability to detect associations with more uncommon outcomes, and, due to the cross-sectional nature of the investigation, causal relationships between demographic variables and poor fetomaternal outcomes cannot be established. The investigation also did not control for putative confounding factors such as maternal comorbidities, socioeconomic status, or differences in clinical management regimens that may affect associations between fetomaternal outcomes and demographic variables.

CONCLUSION

Our study has found that second and third trimester oligohydramnios is associated with severe fetomaternal complications like increased incidences of fetal distress, structural anomalies, malpresentation, intrauterine fetal demise, and operative delivery. The investigation concludes that the demographic indicators, also in particular higher maternal age, earlier gestational age, higher parity, and lower amniotic fluid index, significantly influence the incidence of certain issues like malpresentation, caesarean section, prematurity, and neonatal intensive care unit admission.

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