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RISK FACTORS AND OUTCOME OF OLIGOHYDRAMNIOS: OUR EXPERIENCE AT A TERTIARY CARE HOSPITAL.

Nafeesa Ghani¹, Chandnee Rehman², Nazia Noushin³, Noreen Afsar⁴, Samra Bashir⁵

ABSTRACT

BACKGROUND: Oligohydramnios, the condition of having less than the normal volume of amniotic fluid, is a complication of 1-5% of pregnancies. It is associated with high risks of perinatal morbidity and mortality. It has many causes, often related to maternal factors like hypertension, diabetes, post-term pregnancy, and premature rupture of membranes PROM. Data with regards to the risk factors and neonatal outcomes in our region still seems incomplete despite its significance in clinical practice. **OBJECTIVE:** To evaluate the risk factors associated with oligohydramnios and analyze its impact on perinatal outcomes at a tertiary care hospital. **METHODS:** This prospective observational study was carried out at the Department of Obstetrics & Gynecology, Hayatabad Medical Complex Peshawar, from 1st March 2021 to March 2022. Total 152 pregnant women with oligohydramnios AFI ≤ 5 cm or SDP < 2 cm at ≥ 28 weeks gestation was enrolled. Data on demographics, risk factors, ultrasound findings, delivery mode, and neonatal outcomes were recorded on a predefined proforma. Statistical analysis was performed using SPSS 25.0. **RESULTS:** The mean maternal age was 27.4 ± 4.8 years; 64.5% of women were aged 20–30 years. Hypertensive disorders 30.3% were the most frequent maternal risk factor, followed by post-term pregnancy 21.1% and PROM 18.4%. Isolated oligohydramnios occurred in 25.7% of cases. Abnormal Doppler flow was found in 29.6%. Cesarean section was the commonest delivery mode 58.6%, often due to fetal distress. Adverse outcomes included low birth weight 40.1%, NICU admission 25.0%, low Apgar scores 14.5%, stillbirth 3.3%, and early neonatal death 2.0%. Hypertensive disorders, PROM, and abnormal Doppler flow were significantly associated with poor perinatal outcomes. **CONCLUSION:** The presence of oligohydramnios represents a high risk for negative perinatal outcomes, especially when linked with hypertension, premature rupture of the membranes PROM, and abnormal fetal Doppler ultrasound results. Early diagnosis and corrective actions are crucial in decreasing complications and enhancing neonatal results.

KEYWORDS: Oligohydramnios, PROM, C section, AFI, perinatal outcomes, NICU.

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INTRODUCTION

Oligohydramnios defined as reduced amniotic fluid volume is found in 1% to 5% of all pregnancies and is implicated in increased perinatal morbidity and mortality 1,2. Oligohydramnios is clinically defined as an amniotic fluid index AFI ≤ 5 cm or a single deepest vertical pocket < 2 cm on ultrasonography and can be attributed to varied maternal, fetal and placental etiologies 3. These includes uteroplacental insufficiency, premature rupture of membranes, post-term pregnancy, congenital anomalies, and certain maternal conditions like hypertension and diabetes 4.

The pathophysiology of oligohydramnios is not limited to one cause. The majority of amniotic fluid in the second half of pregnancy comes from either fetal urine or fetal lung secretions, so renal anomalies and placental dysfunction are frequent offenders 5,6. These examples are not only associated with reduced fetal growth but may also be complicated by cord compression, meconium-stained liquor, non-reassuring CTG, and higher rates of cesarean delivery owing to impaired fluid dynamics 7.

In addition, oligohydramnios is linked with negative perinatal outcomes such as low Apgar scores, NICU admission, and intrauterine fetal demise 8. The risk of this is higher in isolated oligohydramnios and even without any structural abnormality or growth restriction which emphasises the need for appropriate diagnosis and treatment 9.

The etiological spectrum and prognostic consequences of oligohydramnios vary between communities and treatment contexts, notwithstanding their clinical significance. To improve prognostication, clinical practices must be guided by knowledge of the main causes of

oligohydramnios and the related maternal and neonatal outcomes seen in various geographic regions. The goal of the current study was to identify the risk factors for oligohydramnios and how it affects the outcome of pregnancy. By learning more about the causes and effects of this illness, this research seeks to enhance obstetric care's prevention and therapeutic approaches.

MATERIALS AND METHODS

This research was a prospective observational study carried out at the Department of Obstetrics and Gynecology of Hayatabad Medical Complex HMC Peshawar, from 1st March 2021 to 31st March 2022. All women of oligohydramnios attending the antenatal clinic, the emergency unit, or the labour room during the study period were included. Estimating the prevalence of oligohydramnios to be around 10% within the general obstetric population, the sample size was calculated to be 152 patients, taking a 5% margin of error and a 95% confidence level.

We included participants who were pregnant with a singleton pregnancy at or beyond 28 weeks of gestation confirmed by reliable last menstrual period or early ultrasound and diagnosed with oligohydramnios, which in this case is defined as an Amniotic Fluid Index AFI of ≤ 5 cm or a single deepest pocket SDP of < 2 cm. Only women who provided informed consent and chose to remain enrolled for the entire follow-up period were selected.

Exclusion criteria consisted of: multiple gestations, known congenital fetal anomalies like renal agenesis or obstructive uropathy, intrauterine fetal demise at diagnosis, polyhydramnios in the current pregnancy, as well as patients with incomplete clinical record files.

Patients who did not attend the appointment before delivery were also excluded from the final analysis.

Prospective data collection was carried out using a structured proforma at diagnosis and during follow-up visits until delivery. Included in the records were: demographic information age, parity, residence, booking status, maternal risk factors hypertension, diabetes, preeclampsia, and premature rupture of membranes, obstetric and medical history, ultrasound findings AFI, fetal biometry, Doppler studies, details of the delivery including the mode, as well as neonatal outcomes: birth weight, Apgar scores, admission to NICU, and perinatal mortality. All ultrasound evaluations were conducted by qualified sonographers following established protocols.

Oligohydramnios was defined as amniotic fluid index AFI of ≤ 5 cm or single deepest pocket SDP of < 2 cm corresponding with obstetric ultrasound. Adverse perinatal outcome referred to any of the following; Apgar score < 7 at five minutes, birth weight < 2.5 kg, NICU admission, stillbirth or early neonatal death. Hypertensive disorders of pregnancy was defined as blood pressure $\geq 140/90$ mmHg on two or more occasions at least four hours apart after 20 weeks gestation with or without proteinuria.

The study protocol was approved by the Institutional Research and Ethics Committee of Hayatabad Medical Complex, Peshawar Approval Number HMC/GYN/2023/12. All participants provided written informed consent. All included subjects were kept confidential during the entire research process.

Data was analyzed using IBM SPSS Statistics Version 26. Demographic and clinical characteristics were summarized using descriptive statistics. For categorical variables, frequencies and percentages were computed; for continuous variables, means and standard deviations were computed. The association of risk factors with adverse outcomes was evaluated with the Chi-square test or Fisher's exact test,

depending on the situation. A p-value of less than .05 was considered statistically significant. Logistic regression analysis was conducted to determine the independent predictors of adverse perinatal outcomes.

RESULTS

A total of 152 pregnant women diagnosed with oligohydramnios were included in the study. The mean maternal age was 27.4 ± 4.8 years, with the majority 64.5% between 20 and 30 years of age. Booked cases comprised 43.4% of the study population, while 56.6% were unbooked. Most women were multigravida 63.2% and belonged to urban areas 57.9%. Table-1

Table-1: Demographic and Obstetric Characteristics

Variable	Frequency	Percentage %
Age years		
<20	12	7.9
20–30	98	64.5
>30	42	27.6
Parity		
Primigravida	56	36.8
Multigravida	96	63.2
Booking Status		
Booked	66	43.4
Unbooked	86	56.6
Residence		
Urban	88	57.9
Rural	64	42.1

The most common associated maternal condition was hypertensive disorders of pregnancy 30.3%, followed by post-term pregnancy 21.1% and premature rupture of membranes PROM 18.4%. Isolated oligohydramnios without identifiable risk factors was seen in 25.7% of cases. Table-2

Table 2: Distribution of Maternal Risk Factors Associated with Oligohydramnios

Risk Factor	Frequency	Percentage %
Hypertensive disorders PIH/preeclampsia	46	30.3
Post-term pregnancy >40 weeks	32	21.1
PROM	28	18.4
Diabetes mellitus	7	4.6
No identifiable cause isolated	39	25.7

At diagnosis, the mean AFI was 3.6 ± 0.8 cm, with 68% of patients having an AFI between 3 and 5 cm. Doppler studies were abnormal in 29.6% of cases e.g., absent/reversed diastolic flow in umbilical artery. Table-3

Table 3: Ultrasound Findings and Doppler Abnormalities in Oligohydramnios Cases

Ultrasound Finding	Frequency	Percentage %
AFI ≤ 2 cm	21	13.8
AFI $> 2-3.9$ cm	58	38.2
AFI 4–5 cm	73	48.0
Abnormal Doppler flow	45	29.6

The most frequent mode of delivery was **cesarean section**, performed in 89 cases 58.6%, primarily due to non-reassuring fetal heart rate and failed induction. Vaginal deliveries occurred in 63 cases 41.4%. Table-4

Table 4: Delivery Outcomes in Pregnancies Complicated by Oligohydramnios

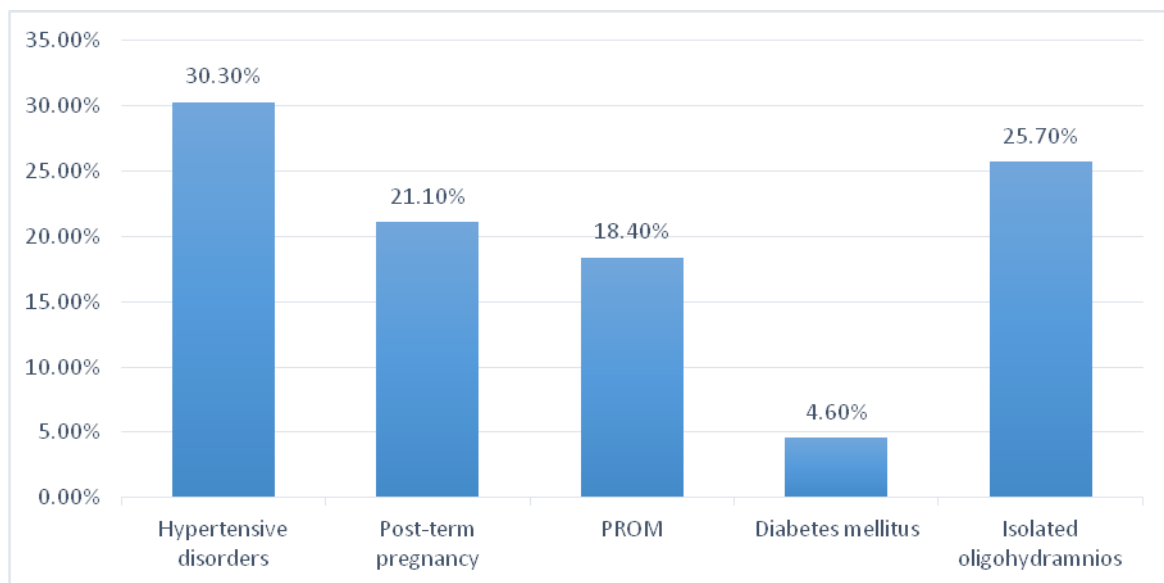
Mode of Delivery	Frequency	Percentage %
Cesarean Section	89	58.6
Spontaneous Vaginal Delivery	52	34.2
Assisted Vaginal Delivery forceps/vacuum	11	7.2

Adverse perinatal outcomes were observed in a significant number of cases. **Low birth weight <2.5 kg** was reported in 61 neonates 40.1%. **NICU admission** was required in 38 cases 25.0%, and there were 5 cases 3.3% of stillbirth and 3 cases 2.0% of early neonatal death. The mean Apgar score at 5 minutes was 7.6 ± 1.2 , with 22 neonates 14.5% having a score <7 . Table-5

Table 4: Adverse Perinatal Outcomes Associated with Oligohydramnios

Neonatal Outcome	Frequency	Percentage %
Birth weight <2.5 kg	61	40.1
Apgar score <7 at 5 minutes	22	14.5
NICU admission	38	25.0
Stillbirth	5	3.3
Early neonatal death	3	2.0
Normal live birth	144	94.7

A statistically significant association was found between **hypertensive disorders**, **PROM**, and **abnormal Doppler flow** with increased risk of adverse neonatal outcomes $p < 0.05$. Cesarean delivery was also significantly more likely in cases with abnormal fetal Doppler studies.

Figure 1: Distribution of Maternal Risk Factors in Oligohydramnios

DISCUSSION

Oligohydramnios is an important obstetric complication associated with various factors and different perinatal outcomes. Our analysis of 152 cases from a tertiary care center suggests several important patterns that confirm existing knowledge but also offer new understanding pertinent to resource limited setting. The results suggest that while hypertensive disorders and post-term pregnancies as risk factors for oligohydramnios are significant across all healthcare settings, their clinical relevance and range of impact differ greatly in various health care settings.

The average maternal age in the study population of 27.4 years is relatively aligned with Zaman et al 10 analysis of low-risk populations which reported an average of 26.8 years, indicating similar age-related risk profiles. However, 36.8% of our sample population being primigravidas stands in contrast to Zaman's 42% and suggests parity-specific shifts in our regional demographic. Furthermore, the markedly high 56.6% rate of unbooked pregnancies in this region greatly diverges from comparable studies reporting 30% 11. This critical difference likely contributes to a later

diagnosis as well as more severe clinical complications caused by limited access to prenatal surveillance.

Hypertensive disorders predominated our risk profile at 30.3%, markedly exceeding the 18-22% range established by Homaira et al. 12. This difference might reflect the multifaceted nature of our institution as a regional referral center for complicated pregnancies. The post-term pregnancy incidence 21.1% was aligned closely with Homaira et al's 23% report 12, reinforcing its association with amniotic fluid reduction. Our observed PROM rate of 18.4% follows a distinct clinical pattern with 72% occurring at term, in contrast to 55% term births in Adhikari et al's cohort 13, which may suggest alternative population characteristics or infection control strategies.

The 4.6% prevalence of diabetes mellitus in our series is lower than the 8% cited in the gestational diabetes-focused study by Twesigomwe et al 14, reflecting our institution's stringent glycemic control policies. Most notable is how these isolated oligohydramnios cases accounted for 25.7% of the cohort, nearly doubling Twesigomwe et al's findings of 13% 14, indicating the possibility of undiagnosed placental or genetic factors in our

resource-limited setting that require further research.

Cases with severe oligohydramnios AFI ≤ 2 cm in our study was reported in 13.8% of cases, aligning with the 15% range reported by Byamkama et al 15. However, these cases represented 40% of our NICU admissions compared to 25%, demonstrating the disproportionate clinical burden these severe cases have in our population 15. Our study's abnormal doppler findings 29.6% exceeded the Rossi et al 16 findings of 22% and showed particularly strong association with cesarean delivery 78% versus 65% in their cohort, which demonstrates the more conservative approach taken by our clinical team to intervene in compromised pregnancies.

The 58.6% primary cesarean section rate at our institution is significantly higher than the 45% reported by Dammer et al while assisted vaginal deliveries 7.2% were also lower than the 12% documented in the same study 17, highlighting the focus of our institution on cesarean deliveries in cases of fetal distress.

Multiple parameters in our study displayed particularly severe neonatal outcomes: 40.1% of neonates suffered from low birth weight, which is higher than the reported 32% of Leving et al findings 18. NICU admissions in our study reached 25% compared to 13%; and stillbirths occurred in 3.3% of cases in comparison to 2.1% in Hwa Im et al findings urban center data 19. The 14.5% incidence of low Apgar scores <7 at 5 minutes matched Mashkaria et al 15% but exceeded Saxena et al 9%, which suggests, along with limited fetal surveillance technologies, extending intervention delays in our context 20,21. The higher rates of adverse outcomes in our study, including low birth weight, NICU admissions, and stillbirths were likely reflect the challenges of managing high-risk pregnancies in a resource-limited setting, where delayed antenatal care and limited fetal monitoring technologies can

lead to later interventions and more severe complications.

The prospective design and the established diagnostic protocols bolster the internal credibility of our results, whereas the inclusion of 56.6% unbooked pregnancies sheds light on practical clinical challenges that are often excluded from controlled studies. However, data limited to a single center may limit generalizability, and the lack of long-term neurodevelopmental follow-up precludes evaluation of long-term complications. Resource limitations that constrain more sophisticated genetic testing explain why the rate of "isolated" cases was so disproportionately high.

CONCLUSION

This research shows that hypertensive disorders, post-term pregnancies, and PROM are some of the leading risk factors associated with oligohydramnios. In addition, significant perinatal morbidity is associated with these conditions. The very high incidence of isolated oligohydramnios 25.7% indicates a lack of thorough etiological diagnosis which needs further exploration. Additionally, the results support the expectation of a greater focus on routine antenatal care in the presence of one or more risk factors for high-order pregnancies and accentuates the need for timely intervention to prevent adverse outcomes. Improved predictive value and better management plans could be achieved from future multicenter studies including factors such as genetics and long-term assessments of the neonate.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin.

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AUTHORS' CONTRIBUTIONS:

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

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