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Impact of Oligohydramnios on Fetomaternal Outcome

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Abstract **Original Research Article**

***Background*:** Oligohydramnios is a common antenatal finding associated with compromised fetal well-being and adverse perinatal outcomes. Its impact on neonatal morbidity and maternal outcomes remains a concern, particularly in resource-limited settings. This study aimed to evaluate the impact of oligohydramnios on fetomaternal outcomes in pregnancies managed at a tertiary care hospital. ***Methods*:** This cross-sectional observational study was conducted at the Department of Obstetrics and Gynaecology, Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh, from December 2009 to June 2010. Fifty pregnant women with sonographically confirmed oligohydramnios between 34 and 40 weeks of gestation were included. Maternal characteristics, severity of oligohydramnios, neonatal condition at birth, perinatal morbidity and mortality, and postpartum maternal complications were analyzed using descriptive and inferential statistics. ***Results*:** The majority of women were multiparous (76%), and 70% delivered preterm. Borderline oligohydramnios was observed in 64% and severe oligohydramnios in 36% of cases. Low birth weight was noted in 66% of neonates. More than half (56%) required neonatal intensive care admission, with respiratory distress syndrome (26%) and meconium aspiration syndrome (28%) being the most frequent complications. Perinatal mortality was low. Postpartum maternal complications occurred in 16.7% of caesarean deliveries, while vaginal deliveries were uncomplicated. ***Conclusion*:** Oligohydramnios is associated with considerable neonatal morbidity and increased perinatal risk, though maternal morbidity remains relatively limited. Vigilant antenatal monitoring and timely intervention are crucial to improving outcomes.

Keywords: Oligohydramnios, Fetomaternal Outcome, Neonatal Morbidity.

INTRODUCTION

Oligohydramnios, defined as a reduction in amniotic fluid volume below the normal range for gestational age, presents substantial clinical implications in obstetrics, primarily due to its association with adverse perinatal and maternal outcomes. The diagnosis of oligohydramnios is typically made through sonographic evaluations, particularly using the amniotic fluid index (AFI) and the single deepest vertical pocket (SDVP) measurement, with an AFI of less than 5 cm or an SDVP of less than 2 cm considered diagnostic thresholds [1, 2]. The presence of oligohydramnios may indicate uteroplacental insufficiency, renal dysfunction in the fetus, or chronic fetal hypoxia, which are critical factors that can complicate pregnancy and lead to severe outcomes [3, 4]. The reported incidence of oligohydramnios varies between 0.5% and 5% of pregnancies, depending on gestational age, population studied, and diagnostic criteria applied [5, 6].

Amniotic fluid serves several physiological roles, including mechanical cushioning, infection protection, thermoregulation, and facilitation of fetal lung and musculoskeletal development. Its volume is primarily determined by the balance between fetal urine production and swallowing in late gestation [7]. Further, the implications of oligohydramnios extend to increased risks associated with neonatal outcomes, necessitating increased vigilance and management strategies for affected pregnancies. Specifically, oligohydramnios is correlated with a heightened incidence of conditions such as low Apgar scores, intrauterine growth restriction, and increased rates of neonatal intensive care unit (NICU) admissions [4-8]. Conditions such as maternal hypertension, post-term pregnancy, premature rupture of membranes, and fetal growth restriction (FGR) are commonly associated etiologies [9].

Multiple studies and meta-analyses have confirmed that oligohydramnios increases the risk of

fetal growth restriction, meconium aspiration, low Apgar scores, and neonatal intensive care unit (NICU) admissions [5-10]. In a systematic review, Rossi and Prefumo demonstrated that isolated oligohydramnios significantly elevates perinatal morbidity and cesarean delivery rates [6]. Similarly, Rabie *et al*., reported that both isolated and complicated oligohydramnios were linked to higher incidences of operative delivery and neonatal distress [5]. These findings emphasize that amniotic fluid volume acts as a sensitive marker of fetal well-being, rather than a benign sonographic observation [11].

In low- and middle-income countries, such as Bangladesh, the burden of oligohydramnios is compounded by delayed diagnosis, limited antenatal surveillance, and suboptimal access to tertiary care facilities [12]. Figueroa *et al*., found that proactive monitoring and timely intervention can substantially reduce perinatal mortality, though neonatal morbidity remains significant in resource-limited settings [12]. The American College of Obstetricians and Gynecologists (ACOG) also recommends close surveillance and individualized delivery planning for pregnancies complicated by oligohydramnios to minimize adverse outcomes [13]. Despite these recommendations, the magnitude of maternal and neonatal risks associated with oligohydramnios varies across populations and healthcare settings. Some evidence suggests that adverse maternal outcomes are largely related to operative interventions rather than the condition itself [14]. Therefore, context-specific data remain vital to refining management strategies.

The present study aims to evaluate the impact of antenatally diagnosed oligohydramnios on fetomaternal outcomes—including neonatal morbidity, perinatal mortality, and maternal complications—among pregnancies managed at a tertiary care hospital in Bangladesh.

MATERIALS & METHODS

This was a hospital-based cross-sectional observational study conducted in the Department of Obstetrics and Gynaecology, Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh. The study was carried out over six months from December 2009 to June 2010. A total of 50 pregnant women with antenatally diagnosed oligohydramnios were included in the study. The study population consisted of women admitted during the third trimester of pregnancy and managed for delivery at the study center.

Inclusion Criteria

- Pregnant women aged 15–40 years
- Gestational age between 34 and 40 completed weeks
- Singleton pregnancy
- Clinically suspected and sonographically confirmed oligohydramnios
- Both primigravida and multigravida women

Exclusion Criteria

- Pregnancies with normal amniotic fluid volume
- Multiple pregnancies
- Pregnancies complicated by medical disorders such as gestational diabetes mellitus, chronic hypertension, or cardiac disease
- Obstetric complications, including eclampsia, antepartum hemorrhage, and polyhydramnios

Data Collection Procedure:

Eligible participants were selected using purposive sampling after admission to the labor ward. Written informed consent was obtained from all participants before inclusion. A predesigned and pretested data collection sheet was used to record demographic characteristics, obstetric history, clinical findings, and investigation results. Oligohydramnios was confirmed by ultrasonographic measurement of the amniotic fluid index using the four-quadrant technique, with AFI ≤8 cm considered abnormal. Fetal surveillance on admission included cardiotocography and ultrasonography. Intrapartum findings, including liquor characteristics and mode of delivery, were documented. Neonatal outcomes such as birth weight, Apgar scores at 1 and 5 minutes, neonatal complications, NICU admission, and early neonatal death were recorded. Maternal outcomes were assessed during the postpartum period, with specific attention to complications following delivery. Confidentiality of patient information was strictly maintained. Ethical principles in accordance with the Declaration of Helsinki were followed throughout the study.

Statistical Analysis:

Data were coded, checked for consistency, and analyzed using SPSS software. Descriptive statistics were used to summarize maternal characteristics, severity of oligohydramnios, and fetomaternal outcomes. Results were expressed as frequencies and percentages. Inferential statistical tests, including chi-square and Z-tests, were applied where appropriate to assess associations between categorical variables. A p-value of <0.05 was considered statistically significant for all analyses.

RESULTS

Table 1: Maternal baseline characteristics (N = 50)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18–20	5	10.0
	20–25	34	68.0
	25–30	10	20.0
	>30	1	2.0
Parity	Nulliparous	12	24.0
	Multiparous	38	76.0
Gestational age at delivery	<37 weeks	35	70.0
	≥37 weeks	15	30.0

The mean age of the participants was 23.5 ± 2.74 years. The majority were multiparous and delivered preterm.

Table 2: Severity of oligohydramnios based on AFI (N = 50)

AFI category	Frequency (n)	Percentage (%)
Borderline oligohydramnios (5.1–8 cm)	32	64.0
Severe oligohydramnios (<5 cm)	18	36.0

Table 3: Neonatal condition at birth (N = 50)

Variable	Category	Frequency (n)	Percentage (%)
Birth weight	<2.5 kg	33	66.0
	≥2.5 kg	17	34.0
Apgar score (1 min)	0–4	6	12.0
	5–6	34	68.0
	≥7	10	20.0
Apgar score (5 min)	0–4	6	12.0
	5–6	25	50.0
	≥7	19	38.0

Low birth weight was observed in two-thirds of neonates. Improvement in Apgar scores between 1 and 5 minutes was noted.

Table 4: Neonatal morbidity and mortality (N = 50)

Outcome	Frequency (n)	Percentage (%)
Respiratory distress syndrome	13	26.0
Meconium aspiration syndrome	14	28.0
Intrauterine death	1	2.0
Stillbirth	1	2.0
Early neonatal death	1	2.0
NICU admission	28	56.0

More than half of the neonates required NICU admission, with respiratory distress and meconium aspiration being the most frequent complications.

Table 5: Postpartum maternal complications among caesarean deliveries (N = 36)

Complication	Frequency (n)	Percentage (%)
Postoperative wound infection	3	6.0
Postpartum hemorrhage	2	4.0
Puerperal pyrexia	1	2.0
No complication	30	60.0

Postpartum complications were observed in 16.7% of women undergoing caesarean section, while all vaginal deliveries had an uncomplicated postpartum course.

DISCUSSION

The present study evaluated the impact of antenatally diagnosed oligohydramnios on fetomaternal outcomes in a tertiary care hospital setting and demonstrated a substantial burden of adverse neonatal

outcomes, alongside comparatively limited maternal morbidity. These findings reaffirm the role of oligohydramnios as a clinically important marker of fetal compromise rather than an isolated ultrasonographic abnormality.

In this cohort, oligohydramnios was more frequently observed among multiparous women. While earlier studies have not consistently identified parity as an independent risk factor for reduced amniotic fluid volume, demographic patterns may vary according to referral pathways, healthcare access, and underlying obstetric risk profiles [15, 16]. Large observational studies and meta-analyses suggest that maternal age and parity function more as contextual modifiers than causal determinants of oligohydramnios [17]. The predominance of multiparity in the present study may therefore reflect the tertiary care setting, where women with prior obstetric histories and complications are more likely to present.

A notable finding was the high proportion of preterm deliveries among women with oligohydramnios. Reduced amniotic fluid volume is frequently a manifestation of chronic uteroplacental insufficiency, which compromises fetal oxygenation and growth and often necessitates early delivery to prevent stillbirth or severe neonatal morbidity [18, 19]. Previous studies have similarly reported increased rates of indicated preterm birth among pregnancies complicated by oligohydramnios, particularly when diagnosed in the late third trimester [20]. In this context, preterm delivery likely represents a protective intervention rather than spontaneous preterm labor, underscoring the importance of timely antenatal surveillance.

Neonatal outcomes in the present study revealed a high prevalence of low birth weight, affecting nearly two-thirds of neonates. This finding supports the well-established association between oligohydramnios and fetal growth restriction, both of which are commonly linked to placental insufficiency [18, 19]. Casey *et al*., and Locatelli *et al*., reported lower proportions of low birth weight in cohorts with isolated or term oligohydramnios, highlighting how gestational age at diagnosis and severity of fluid reduction influence outcomes [20, 21]. The higher rate observed in this study likely reflects the combined effects of prematurity and chronic intrauterine compromise.

Assessment of neonatal condition at birth further underscored the adverse impact of oligohydramnios. Although some improvement in Apgar scores was observed between the first and fifth minutes, a significant proportion of neonates continued to demonstrate suboptimal scores at five minutes. Previous studies have linked low amniotic fluid volume to intrapartum hypoxia resulting from umbilical cord compression and reduced placental reserve [22]. Persistently low Apgar scores at five minutes are clinically important, as they are associated with increased risk of neonatal morbidity and long-term neurodevelopmental impairment.

Neonatal morbidity was a prominent feature of this study, with respiratory distress syndrome and meconium aspiration syndrome being the most frequently observed complications. Chronic fetal hypoxia is known to stimulate meconium passage in utero, and reduced amniotic fluid volume may increase the concentration of meconium, thereby exacerbating the risk of aspiration. While some studies have reported lower rates of meconium aspiration in isolated oligohydramnios, systematic reviews and meta-analyses have demonstrated a consistent association between oligohydramnios and adverse neonatal respiratory outcomes, particularly when accompanied by fetal growth restriction [23, 24]. The high rate of NICU admission observed in this cohort reflects the cumulative impact of prematurity, low birth weight, and intrapartum compromise.

Perinatal mortality in the present study was relatively low, with only isolated cases of intrauterine death, stillbirth, and early neonatal death. Although oligohydramnios is a recognized risk factor for stillbirth, especially in the presence of fetal growth restriction [7-24], timely diagnosis, close surveillance, and early delivery may substantially reduce mortality in tertiary care settings. This finding underscores the potential benefit of proactive obstetric management when oligohydramnios is identified.

From a maternal perspective, postpartum complications were infrequent and occurred exclusively among women who underwent caesarean section. This observation is consistent with previous reports indicating that maternal morbidity in oligohydramnios is largely related to operative delivery rather than the condition itself [25]. Most women in the present study experienced an uncomplicated postpartum course, suggesting that while oligohydramnios imposes a significant neonatal burden, its direct impact on maternal health is limited when managed appropriately.

Overall, the findings of this study reinforce the concept that oligohydramnios serves as a marker of underlying fetal and placental compromise and is associated with increased neonatal morbidity. The results emphasize the importance of vigilant antenatal surveillance, individualized timing of delivery, and preparedness for neonatal resuscitation and intensive care. In resource-limited settings, strengthening antenatal detection and referral pathways may play a critical role in improving outcomes for pregnancies complicated by oligohydramnios.

Limitations of the Study

This study had several limitations.

- The relatively small sample size and short duration of the study limit the generalizability of the findings.
- The use of purposive sampling may have introduced selection bias.

CONCLUSION

Oligohydramnios is associated with significant adverse neonatal outcomes, including low birth weight, neonatal morbidity, and increased need for intensive care admission. While maternal postpartum complications were relatively infrequent, the condition markedly increased perinatal risk. Early diagnosis, close fetal surveillance, and timely obstetric intervention are essential to improve fetomaternal outcomes in pregnancies complicated by oligohydramnios.

Conflicts of Interest: There are no conflicts of interest.

Ethical Approval: The study was approved by the Institutional Ethics Committee.

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