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Mode of Delivery and Fetomaternal Complications in Pregnancy Affected by Oligohydramnios

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Abstract

Background: Oligohydramnios is a clinically significant obstetric condition associated with increased intrapartum intervention and adverse perinatal outcomes. Reduced amniotic fluid volume compromises fetal well-being by increasing the risk of umbilical cord compression and uteroplacental insufficiency, thereby influencing delivery decisions and neonatal outcomes. This study aimed to evaluate the mode of delivery and fetomaternal outcomes in pregnancies complicated by oligohydramnios. ***Methods:*** A hospital-based cross-sectional observational study was conducted in the Department of Obstetrics and Gynaecology, Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh, from December 2009 to June 2010. A total of 50 pregnant women with sonographically confirmed oligohydramnios were included in this study. Cardiotocography was performed upon admission to assess the fetal status. The mode of delivery, indications for caesarean section and neonatal outcomes were recorded. Associations between oligohydramnios severity and outcomes were analyzed. ***Results:*** Non-reassuring cardiotocography patterns were observed in 64% of the cases. Caesarean section was the predominant mode of delivery (72%), with fetal distress being the leading indication (61.1%). All women with severe oligohydramnios required caesarean delivery, demonstrating a significant association between severity and delivery mode ($p < 0.001$). Neonates born to mothers with severe oligohydramnios had a higher incidence of Apgar scores below 7 at five minutes ($p < 0.05$). ***Conclusion:*** Severe oligohydramnios is strongly associated with non-reassuring fetal surveillance, increased operative delivery rates and adverse neonatal outcomes. Severity-based risk stratification and vigilant intrapartum monitoring are essential for optimizing fetomaternal outcomes.

Keywords: Oligohydramnios; Amniotic fluid index, mode of delivery, neonatal outcome.

INTRODUCTION

Oligohydramnios, defined as a reduced volume of amniotic fluid relative to gestational age, remains a significant obstetric concern due to its association with adverse maternal and perinatal outcomes. Amniotic fluid plays a crucial role in fetal growth, movement and protection, as well as in maintaining umbilical cord patency and facilitating lung development. Quantitative assessment using the amniotic fluid index (AFI), particularly values below 5 cm or borderline ranges between 5 and 8 cm, is widely employed to identify pregnancies at increased risk of complications [1].

The prevalence of oligohydramnios varies depending on gestational age, diagnostic criteria and underlying maternal or fetal conditions. Studies conducted in both high- and low-resource settings have consistently reported increased rates of operative delivery, fetal distress, low Apgar scores and neonatal intensive care unit admissions among pregnancies complicated by oligohydramnios [2,3]. These risks appear to be particularly pronounced when oligohydramnios is diagnosed in late preterm or term pregnancies, where clinical decisions regarding timing and mode of delivery become critical [4].

The pathophysiology of oligohydramnios is multifactorial and may reflect uteroplacental insufficiency, impaired fetal renal perfusion, or chronic placental pathology. Reduced amniotic fluid volume is

frequently associated with abnormal fetal heart rate patterns during labor, increasing the likelihood of intrapartum intervention [5]. Consequently, oligohydramnios has been identified as an important contributor to the rising rates of caesarean section, often performed for suspected fetal compromise [6].

Despite extensive literature on oligohydramnios, there remains ongoing debate regarding optimal management strategies, particularly in isolated or borderline cases. Some studies suggest that borderline oligohydramnios may carry risks comparable to severe forms, while others report more favourable outcomes with expectant management [7,8]. The inconsistency in findings underscores the need for context-specific evidence, especially from low- and middle-income countries where access to continuous fetal monitoring and neonatal care may be limited.

In Bangladesh and similar settings, hospital-based data on the fetomaternal impact of oligohydramnios remain relatively scarce. Existing regional studies indicate high rates of operative delivery and neonatal compromise; however, variations in study design, gestational age inclusion and severity stratification limit comparability [9,10]. Furthermore, few studies have systematically examined the relationship between the severity of oligohydramnios, fetal surveillance findings on admission and the subsequent mode of delivery.

Understanding these associations is clinically important, as early identification of high-risk cases may guide intrapartum monitoring and delivery planning, potentially reducing preventable morbidity. Evaluating neonatal outcomes alongside delivery modes also provides insight into whether increased intervention translates into improved fetal well-being or merely reflects heightened clinical concern.

Therefore, the present study was undertaken to assess the mode of delivery and fetomaternal complications among pregnancies affected by oligohydramnios at a tertiary care hospital in Bangladesh. By examining maternal characteristics, CTG findings, delivery patterns and neonatal outcomes in relation to the severity of oligohydramnios, this study aims to contribute contextually relevant evidence to inform clinical decision-making and optimize perinatal outcomes.

MATERIALS & METHODS

This hospital-based cross-sectional observational study was conducted at the Department of Obstetrics and Gynaecology, Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh, over six months from December 2009 to June 2010. The study population comprised 50 pregnant women with antenatally diagnosed oligohydramnios. Eligible participants included women aged 15–40 years with singleton pregnancies between 34 and 40 completed weeks of gestation, in whom oligohydramnios was suspected clinically and confirmed sonographically using the four-quadrant amniotic fluid index technique. Patients with normal amniotic fluid volume, multiple gestations, medical disorders such as diabetes mellitus or chronic hypertension and obstetric complications, including eclampsia, antepartum hemorrhage and polyhydramnios, were excluded. Participants were selected using purposive sampling after their hospital admission. Data were collected using a structured, pretested data collection sheet that recorded demographic characteristics, obstetric history, gestational age, amniotic fluid index, cardiotocography findings on admission, mode of delivery, indications for caesarean section and neonatal outcomes. Cardiotocography was performed for at least 20 min upon admission to assess the baseline fetal heart rate, variability, accelerations and decelerations. Written informed consent was obtained from all participants and their confidentiality was maintained throughout the study. Ethical principles in accordance with the Declaration of Helsinki were followed. Data were analyzed using the SPSS software. Descriptive statistics were used to summarize variables and associations between the severity of oligohydramnios and mode of delivery or neonatal compromise were assessed using chi-square and Z-tests, with a p-value of <0.05 considered statistically significant.

RESULTS

Table 1: Baseline maternal and obstetric 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

Table 1 presents the baseline maternal and obstetric characteristics of the participants. Most women were aged between 20 and 25 years (68.0%), followed by those aged 25–30 years (20.0%). Nulliparous women accounted for 24.0% of the cohort, while 76.0% were multiparous. Regarding gestational age at delivery, 70.0% of pregnancies were delivered before 37 completed weeks, whereas 30.0% reached 37 weeks or beyond.

Table 2: Fetal surveillance findings on admission (CTG) (N = 50)

CTG tracing	Frequency (n)	Percentage (%)
Reassuring	18	36.0
Non-reassuring	32	64.0

Table 2 describes fetal surveillance findings based on CTG performed at admission. Reassuring CTG patterns were observed in 36.0% of cases, while 64.0% demonstrated non-reassuring tracings, indicating a higher frequency of abnormal fetal heart rate patterns in the study population.

Table 3: Mode of delivery (N = 50)

Mode of delivery	Frequency (n)	Percentage (%)
Normal vaginal delivery	10	20.0
Assisted vaginal delivery (ventouse)	4	8.0
Caesarean section	36	72.0

Table 3 shows the modes of delivery among the study participants. Caesarean section was the predominant mode, accounting for 72.0% of deliveries. Normal vaginal delivery occurred in 20.0% of cases, while assisted vaginal delivery using ventouse was performed in 8.0%.

Table 4: Indications for caesarean section (N = 36)

Indication	Frequency (n)	Percentage (%)
Fetal distress	22	61.1
Failed induction	7	19.4
Malpresentation	7	19.4

Table 4 outlines the indications for caesarean section. Fetal distress was the most common indication, reported in 61.1% of cases. Failed induction and malpresentation were each responsible for 19.4% of caesarean deliveries.

Table 5: Severity of oligohydramnios and mode of delivery (N = 50)

AFI category	Caesarean section	Vaginal delivery	p-value
Borderline oligohydramnios (n=32)	18	14	<0.001
Severe oligohydramnios (n=18)	18	0	

Table 5 compares the mode of delivery according to the severity of oligohydramnios. Among women with borderline oligohydramnios, 18 underwent caesarean section and 14 had vaginal deliveries. In contrast, all women with severe oligohydramnios (n = 18) required caesarean delivery. This association was statistically significant ($p < 0.001$).

Table 6: Severity-based neonatal compromise (N = 50)

Variable	Borderline oligohydramnios (n=32)	Severe oligohydramnios (n=18)	p-value
Meconium-stained liquor	8	6	>0.05
Apgar score <7 at 5 min	16	15	<0.05

Table 6 presents neonatal outcomes stratified by the severity of oligohydramnios. Meconium-stained liquor was observed in both borderline and severe groups, with no statistically significant difference ($p > 0.05$). However, a low Apgar score (<7 at 5 minutes) was more frequent in the severe oligohydramnios group and this difference was statistically significant ($p < 0.05$).

DISCUSSION

The present study investigated the relationship between oligohydramnios and fetomaternal outcome, especially mode of delivery, fetal surveillance results and neonatal compromise. The results indicate the high prevalence of non-reassuring cardiotocography (CTG) during admission and the predominantly high use of caesarean section, predominantly among women with

severe oligohydramnios. The findings are consistent with increasing evidence that abnormally low amniotic fluid volume is the consequence of impaired uteroplacental functioning and a predisposing factor to intrapartum fetal intolerance [4,11].

This study indicated that almost two-thirds of the women showed non-reassuring CTG traces during their admission, which highlights the susceptibility of fetuses during pregnancies with oligohydramnios. Figueroa *et al.,* and Ibrahim *et al.,* have also reported similar rates of abnormal fetal heart rate patterns, with the former explaining the results as a consequence of cord compression and reduced placental reserve [2,5]. The lack of cushioning provided by the amniotic fluid could worsen intermittent umbilical cord obstruction during uterine contractions, and thus, the risk of fetal hypoxia and emergency obstetric care becomes inevitable.

The delivery mode results showed that the rate of the caesarean section was quite high (72 percent), and fetal distress was the major sign. This is consistent with previous research in South Asia and other low- and middle-income environments where caesarean section rate has been found between 60-80 percent among women with oligohydramnios [12,13]. The same findings were reported by Sawant et al. and Lavanya *et al.,* who indicated fetal distress as the most common cause of operative delivery, which supports the relationship between oligohydramnios and intrapartum compromise [4,6]. The current research also shows that the severity of oligohydramnios is a decisive factor because all the women with severe oligohydramnios gave birth via cesarean delivery.

The statistically significant correlation between severe oligohydramnios and caesarean section in the study is in line with the results reported by Shiferaw *et al.,* and Gupta *et al.,* who found the increasing rates of operative delivery with their declining AFI value [3,14]. These results indicate that AFI is not only a diagnostic factor but also a prognostic tool for delivery outcomes. Conversely, borderline oligohydramnios recorded a mixed pattern of vaginal and operative births, which is an indication of the current clinical debates trying to best manage this subgroup [7].

The clinical pertinence of the severity of oligohydramnios is also further demonstrated in the present study through neonatal outcomes. Even though the presence of meconium-stained liquor was observed in both groups, with the lack of a statistically significant difference, low Apgar scores at five minutes were significantly higher in infants who were born to mothers with severe oligohydramnios. Similar findings have been documented by Yadav *et al.,* and Naveiro-Fuentes *et al.,* who found low Apgar scores and neonatal morbidity in severe or persistent oligohydramnios [7,8]. These results support the hypothesis that, in the extreme instances of chronic intrauterine compromise, it can come before labor, constraining the neonatal physiological reserves at birth.

Interestingly, the absence of a large difference between severity groups in meconium-stained liquor is similar to that reported by some prospective studies, indicating that meconium passage might be affected by acute intrapartum stress and not chronic depletion of fluids only [13,15]. Conversely, Apgar scores indicate contemporaneous adaptation in neonates and might be more susceptible to cumulative hypoxic exposure, which is why they relate better to the severity of oligohydramniosis.

A large percentage of preterm deliveries in this study is also an issue of concern. The same pattern has been observed in hospital-based research in Bangladesh and other adjacent areas, where clinicians tend to pursue early delivery interventions, in the setting of oligohydramnios, to reduce the risk of stillbirths [9,16]. Although the practice can help to decrease intrauterine fetal demise, it can also raise the rates of operative delivery, which demonstrates the fine line between fetal monitoring and intervention.

Overall, the findings of this study align closely with existing literature, reinforcing the concept that oligohydramnios, particularly in its severe form, is associated with increased intrapartum fetal compromise, operative delivery and adverse neonatal outcomes. The results support the continued use of AFI-based severity stratification in guiding clinical decision-making and emphasize the importance of vigilant fetal monitoring in affected pregnancies.

Limitations and recommendations

The single-center design and small sample size may limit generalizability. Larger multicenter studies incorporating long-term neonatal outcomes are recommended to refine management strategies and optimize evidence-based decision-making for pregnancies affected by oligohydramnios.

CONCLUSION

Pregnancy complicated by oligohydramnios, particularly in severe cases, is associated with increased rates of non-reassuring fetal heart rate patterns, caesarean delivery and neonatal compromise. The findings highlight the clinical importance of severity-based assessment using the amniotic fluid index to guide intrapartum monitoring and delivery planning. Early identification and timely intervention may improve perinatal outcomes in resource-limited settings.

Conflicts of Interest: None.

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

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