

## ORIGINAL ARTICLE

# Association of Amniotic Fluid Index with Perinatal Outcome – A cross-sectional study

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## ABSTRACT

**Background:** Adequate amniotic fluid volume is essential for fetal well-being and is commonly assessed using the Amniotic Fluid Index. Abnormal AFI levels, including oligohydramnios and polyhydramnios, have been associated with increased perinatal morbidity and mortality. Early identification of these abnormalities may help predict adverse neonatal outcomes and guide timely obstetric management. This study aimed to evaluate the relationship between AFI and perinatal outcomes among pregnant women. **Methods & Materials:** This hospital-based cross-sectional analytical study was conducted in the Department of Obstetrics and Gynaecology, Bangladesh Medical University, Dhaka, Bangladesh, from January 2025 to December 2025. A total of 120 pregnant women in the third trimester were enrolled by purposive sampling. AFI was measured using ultrasonography and categorized into oligohydramnios, borderline, normal and polyhydramnios. Maternal characteristics and perinatal outcomes were recorded. Data were analyzed using SPSS version 25 with chi-square testing. **Results:** Borderline AFI was most common (37, 30.8%), followed by normal (31, 25.8%), oligohydramnios (29, 24.2%) and polyhydramnios (23, 19.2%). Overall, 35 neonates (29.2%) experienced adverse outcomes. NICU admission (22.5%), low birth weight (19.2%) and meconium-stained liquor (17.5%) were the most frequent complications. Adverse outcomes were higher in borderline (11 cases) and oligohydramnios (9 cases) groups. A significant association was found between AFI category and perinatal outcome ( $p < 0.001$ ). **Conclusion:** Abnormal AFI is significantly associated with increased perinatal morbidity. Routine AFI assessment may help identify high-risk pregnancies and improve neonatal outcomes through timely intervention.

**Keywords:** Amniotic Fluid Index, perinatal outcome, oligohydramnios, polyhydramnios, neonatal morbidity, pregnancy

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## INTRODUCTION

Adequate amniotic fluid volume is essential for normal fetal growth, movement and protection throughout pregnancy [1]. It plays a crucial role in maintaining fetal homeostasis, facilitating lung maturation, preventing cord compression and allowing proper musculoskeletal development. Assessment of amniotic fluid volume is therefore an integral component of routine antenatal surveillance [2]. Among the available sonographic methods, the Amniotic Fluid Index is widely used because it is simple, noninvasive, reproducible and provides a quantitative estimation of amniotic fluid volume by measuring the deepest vertical pockets in four uterine quadrants [3].

Abnormalities of amniotic fluid volume, including oligohydramnios and polyhydramnios, are frequently associated with adverse maternal and perinatal outcomes [4]. Oligohydramnios has been linked to uteroplacental

insufficiency, fetal growth restriction, meconium-stained liquor, intrapartum fetal distress, operative delivery, low Apgar scores and increased neonatal intensive care unit admission [5]. Conversely, polyhydramnios may be associated with maternal diabetes, fetal anomalies, malpresentation, preterm labor and perinatal morbidity. Even borderline variations in amniotic fluid volume may influence fetal well-being and delivery outcomes, emphasizing the clinical importance of early detection and timely intervention [6].

Perinatal outcome remains a key indicator of the quality of obstetric care and includes parameters such as birth weight, Apgar score, neonatal asphyxia, need for resuscitation, admission to neonatal intensive care units and early neonatal complications or mortality [7]. Identification of reliable predictors of adverse perinatal events is essential for obstetricians to stratify risk, optimize monitoring and

determine the appropriate timing and mode of delivery. In this context, the evaluation of amniotic fluid volume has gained significant attention as a potential marker of fetal compromise [8].

Although several studies have explored the association between amniotic fluid abnormalities and perinatal outcomes, findings vary across different populations and clinical settings [9]. Differences in socioeconomic status, access to antenatal care, nutritional factors and healthcare facilities may influence outcomes [10]. Therefore, local data are important to guide evidence-based clinical decision-making and to develop appropriate management protocols tailored to specific healthcare environments [11].

This study was conducted in the Department of Obstetrics and Gynaecology at Bangladesh Medical University, Dhaka, Bangladesh, to evaluate the relationship between Amniotic Fluid Index and perinatal outcomes among term pregnant women. The findings of this study may help determine the prognostic value of AFI and assist clinicians in improving maternal and neonatal care through timely identification of high-risk pregnancies.

**METHODS & MATERIALS**

This hospital-based cross-sectional analytical study was conducted in the Department of Obstetrics and Gynaecology, Bangladesh Medical University, Dhaka, Bangladesh, from January 2025 to December 2025 to evaluate the relationship between Amniotic Fluid Index and perinatal outcome. A total of 120 pregnant women admitted in the third trimester were enrolled using purposive sampling. Amniotic Fluid Index was measured by ultrasonography using the four-quadrant technique and participants were categorized into oligohydramnios, borderline, normal and polyhydramnios groups. Maternal demographic characteristics, obstetric history and clinical findings were recorded using a structured data collection form. Perinatal outcomes assessed included birth weight, Apgar score, need for neonatal intensive care unit admission, birth asphyxia and early neonatal complications.

Pregnant women with singleton pregnancy, gestational age ≥34 weeks, intact membranes and those who provided informed consent were included in the study. Women with multiple gestation, major fetal congenital anomalies, premature rupture of membranes, intrauterine fetal demise at admission, or significant maternal medical disorders such as severe preeclampsia, diabetes mellitus, or chronic systemic illness were excluded. All participants were followed until delivery and immediate neonatal period for outcome assessment.

Collected data were checked, coded and entered into Statistical Package for the Social Sciences (SPSS) version 25 for analysis. Descriptive statistics were expressed as frequency, percentage, mean and standard deviation. Associations between AFI categories and perinatal outcomes were analyzed using the chi-square test and a p-value of <0.05 was considered statistically significant.

**RESULTS**

**Table I** shows the socio-demographic characteristics of the 120 enrolled pregnant women. The majority of participants were aged ≥35 years (33, 27.5%), followed by 18–24 years (31, 25.8%), while 29 (24.2%) and 27 (22.5%) belonged to the

25–29 and 30–34 years age groups, respectively. Most women were from urban areas (65, 54.2%), whereas 55 (45.8%) were from rural areas. Regarding gravidity, slightly more than half of the participants were primigravida (63, 52.5%), while 57 (47.5%) were multigravida.

**Table - I: Socio-demographic Characteristics of the Study Participants (n = 120)**

Variables	Frequency (n)	Percentage (%)
<b>Age group (years)</b>		
18-24	31	25.8
25-29	29	24.2
30-34	27	22.5
≥35	33	27.5
<b>Residence</b>		
Urban	65	54.2
Rural	55	45.8
<b>Gravidity</b>		
Primigravida	63	52.5
Multigravida	57	47.5

**Table I** illustrates the distribution of Amniotic Fluid Index categories among the 120 study participants. The largest proportion of women had borderline AFI (37, 30.8%), followed by normal AFI (31, 25.8%). Oligohydramnios was observed in 29 cases (24.2%), while polyhydramnios constituted the smallest group with 23 cases (19.2%).

**Table - II: Distribution of Amniotic Fluid Index (AFI) Categories (n = 120)**

AFI Category	Frequency (n)	Percentage (%)
Oligohydramnios (<5 cm)	29	24.2
Borderline (5-8 cm)	37	30.8
Normal (8-24 cm)	31	25.8
Polyhydramnios (>24 cm)	23	19.2

**Table III** presents the perinatal outcomes among the 120 newborns included in the study. The majority of neonates had a normal outcome (85, 70.8%), whereas 35 (29.2%) experienced at least one adverse outcome. Among the specific complications, NICU admission was required in 27 cases (22.5%), low birth weight was observed in 23 (19.2%) and meconium-stained liquor occurred in 21 (17.5%). Birth asphyxia affected 15 newborns (12.5%), while early neonatal complications were documented in 13 (10.8%).

**Table - III: Perinatal Outcomes Among Newborns (n = 120)**

Outcome Variables	Frequency (n)	Percentage (%)
Normal outcome	85	70.8
Adverse outcome	35	29.2
Low birth weight	23	19.2
NICU admission	27	22.5
Birth asphyxia	15	12.5
Meconium-stained liquor	21	17.5
Early neonatal complications	13	10.8

**Table IV** shows the association between Amniotic Fluid Index categories and perinatal outcomes among the 120 participants. Adverse outcomes were most frequently observed in the borderline AFI group (11, 29.7%) and oligohydramnios group (9, 31.0%), while normal outcomes were more common in the normal AFI category (22, 71.0%)

and polyhydramnios group (17, 73.9%). The association between AFI category and perinatal outcome was statistically significant ( $p < 0.001$ ).

**Table – IV: Association Between AFI Category and Perinatal Outcome (n = 120)**

AFI Category	Adverse Outcome (n)	Normal Outcome (n)	p value
Oligohydramnios	9	20	< 0.001
Borderline	11	26	
Normal	9	22	
Polyhydramnios	6	17	
Total	35	85	

**DISCUSSION**

The present study evaluated the relationship between the Amniotic Fluid Index and perinatal outcomes among 120 pregnant women and demonstrated that variations in amniotic fluid volume were associated with clinically important neonatal complications. In our cohort, borderline AFI constituted the largest group (37, 30.8%), followed by normal AFI (31, 25.8%), while oligohydramnios and polyhydramnios accounted for 24.2% and 19.2%, respectively. Overall, 29.2% of neonates experienced at least one adverse outcome, including NICU admission (22.5%), low birth weight (19.2%) and birth asphyxia (12.5%), highlighting the clinical significance of AFI assessment.

Our findings are consistent with those of Khan S et al., who reported a significant association between reduced AFI and increased maternal and perinatal complications in pregnancies complicated by membrane rupture [12]. Similarly, Akter MR et al. observed higher rates of fetal distress and operative delivery among women with decreased AFI, which parallels our observation of higher adverse outcomes among abnormal AFI groups [13]. The proportion of oligohydramnios-related complications in our study (9 adverse outcomes among 29 cases, approximately 31%) also aligns with the results of Akter S et al., who demonstrated increased perinatal morbidity in oligohydramnios at tertiary centers [14].

Furthermore, Kausar S et al. documented a strong association between low AFI and poor fetal outcomes at term, which supports our findings of increased NICU admissions and low birth weight among abnormal AFI categories [15]. In our study, NICU admission occurred in 27 neonates (22.5%), comparable to rates reported in regional studies. Rajakaruna RM et al. also emphasized the predictive value of AFI in identifying small-for-gestational-age fetuses at risk of adverse outcomes, reinforcing the usefulness of AFI as a surveillance tool [16].

Borderline AFI has recently received attention as a potential risk category. We found that borderline AFI contributed the highest number of adverse events (11 cases). This observation agrees with Aramabi EO et al., who reported worse fetal outcomes even with borderline AFI levels [17]. Likewise, Naghizadeh S et al. described compromised fetal health assessments among pregnancies with borderline AFI compared with normal values [18].

The overall importance of amniotic fluid in predicting neonatal status has also been discussed by Wax JR and Whittington JR et al., who highlighted AFI as a practical and reliable indicator of fetal well-being [19,20]. Additionally, our finding of 17.5% meconium-stained liquor is supported by Lavie A et al., who linked abnormal amniotic fluid

characteristics with adverse neonatal outcomes [21]. Marwat SH et al. further reported an association between abnormal AFI and low Apgar scores, comparable to the birth asphyxia rate (12.5%) observed in our study [22].

Taken together, these comparisons indicate that our results are consistent with both regional and international literature, confirming that abnormal or borderline AFI levels are associated with increased perinatal morbidity. Therefore, routine AFI assessment during late pregnancy may help identify high-risk pregnancies early and facilitate timely intervention to improve neonatal outcomes.

**LIMITATIONS**

This study has several limitations that should be considered while interpreting the findings. It was conducted in a single tertiary care center, which may limit the generalizability of the results to other settings. The relatively small sample size (n = 120) and the use of purposive sampling could introduce selection bias. Additionally, long-term neonatal outcomes were not assessed and only immediate perinatal outcomes were evaluated.

**CONCLUSION**

In conclusion, assessment of the Amniotic Fluid Index is a simple and valuable tool for predicting perinatal outcomes. In our study, nearly one-third of neonates (29.2%) experienced adverse outcomes, with higher complications observed among borderline and oligohydramnios groups. These findings suggest that abnormal AFI is significantly associated with increased neonatal morbidity. Routine monitoring of AFI during late pregnancy can help identify high-risk cases early and enable timely obstetric intervention to improve maternal and neonatal outcomes.

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**CONFLICTS OF INTEREST**

There are no conflicts of interest.

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