

ASSESSMENT OF PERINATAL OUTCOMES IN PREGNANCIES WITH BORDERLINE AMNIOTIC FLUID INDEX IN THE THIRD TRIMESTER

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ABSTRACT

Objective: To assess maternal and neonatal outcomes among women with borderline amniotic fluid index (AFI 5-8 cm) during the last trimester of pregnancy. **Method:** This single-centre, hospital-based prospective observational study enrolled 80 eligible women with singleton, cephalic pregnancies and intact membranes at Amaltas Institute of Medical Sciences and Hospital, Dewas. Participants were followed from enrolment until delivery. Maternal outcomes included intrapartum complications, mode of delivery and postpartum haemorrhage; neonatal outcomes included gestational age at delivery, birth weight, Apgar scores, meconium staining, NICU admission, complications and mortality. Data were analysed descriptively. **Result:** Caesarean section occurred in 71.25% of participants; fetal distress was the leading indication (29.82% of caesareans). Preterm delivery occurred in 41.25%, low birth weight in 51.25%, NICU admission in 16.25%, and neonatal complications in 16.25%. Meconium staining occurred in 5.00%. At five minutes, 78.75% of neonates had an Apgar score of 10. Neonatal mortality was 3.75%. **Conclusion:** Pregnancies with borderline AFI in this cohort showed substantial operative delivery and low-birth-weight burdens, although most neonates achieved favourable five-minute Apgar scores. Close antenatal and intrapartum surveillance is warranted; comparative studies are required to determine the independent effect of borderline AFI.

KEYWORDS

Borderline Amniotic Fluid Index; Perinatal Outcome; Caesarean Section; Low Birth Weight; Nicu Admission

INTRODUCTION

haemorrhage, previous caesarean section, and an indication for Amniotic fluid is a dynamic biological medium that protects the fetus, permits movement and lung development, prevents umbilical cord compression, and reflects fetal-placental wellbeing. In the third trimester its volume is determined mainly by fetal urine production and removal through swallowing and intramembranous absorption. Reduced uteroplacental and fetal renal perfusion can therefore reduce amniotic fluid volume, although a low measurement does not invariably indicate placental pathology [1].

The amniotic fluid index (AFI) is calculated by dividing the uterus into four quadrants, measuring the deepest unobstructed vertical pocket in each quadrant, and summing the four measurements [2]. Oligohydramnios is generally defined as AFI below 5 cm, whereas borderline AFI commonly denotes 5-8 cm. This intermediate range is neither clearly normal nor unequivocally pathological and lacks a universally accepted management pathway [3,4].

Borderline AFI may represent physiological variation or an early, compensated stage of placental dysfunction. Reduced fluid can increase the possibility of cord compression during uterine contractions and may contribute to non-reassuring fetal heart-rate patterns. Studies have variably reported increased caesarean delivery, low birth weight, meconium-stained liquor, low Apgar scores and NICU admission [5-9]. Interpretation is complicated by differing AFI thresholds, gestational ages, clinical practices and comparator groups. Prospective evidence from rural and semi-urban Indian tertiary-care settings remains limited. The present study therefore evaluated perinatal outcomes among women with borderline AFI during the last trimester, focusing on mode of delivery and immediate neonatal outcomes.

MATERIAL AND METHOD

Study Design and Setting

A single-centre, hospital-based, prospective observational study was conducted over 18 months (June 2024-November 2025) in the Department of Obstetrics and Gynaecology, Amaltas Institute of Medical Sciences and Hospital, Dewas, Madhya Pradesh. Institutional Ethics Committee approval and written informed consent were obtained before enrolment. The study received no external funding, and no conflict of interest was declared.

Study Population

Pregnant women attending antenatal services or admitted for delivery were screened. Eighty eligible and consenting participants were enrolled consecutively by convenience sampling and followed from enrolment until delivery and the immediate neonatal period.

Inclusion and Exclusion Criteria

Women aged 18-45 years with singleton pregnancy, gestational age 28-40 weeks, cephalic presentation, intact membranes and AFI 5-8 cm were included. Exclusion criteria were multiple gestation, AFI below 5 cm or above 8 cm, polyhydramnios, premature or preterm premature rupture of membranes, malpresentation, antepartum elective caesarean delivery unrelated to amniotic-fluid variation.

Assessment and Outcomes

AFI was obtained from obstetric ultrasonography by summing the deepest vertical pocket in each of four uterine quadrants. Maternal demographics, parity, booking status, socioeconomic status and intrapartum events were recorded on a structured proforma. The primary outcome was mode of delivery, particularly caesarean section for fetal distress. Secondary outcomes were gestational age at delivery, postpartum haemorrhage, neonatal birth weight, one- and five-minute Apgar scores, meconium staining, congenital anomaly, NICU admission, neonatal complications and mortality.

Data Quality and Analysis

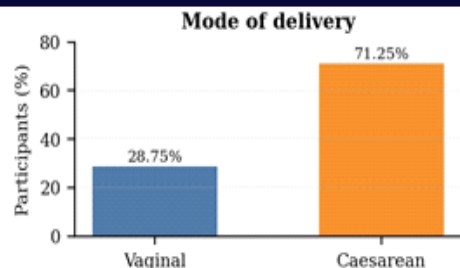
Completed proformas were cross-checked against delivery records, neonatal charts and source documents. Data were entered into an electronic master sheet and verified for transcription errors. Categorical variables are presented as frequency and percentage; birth weight is additionally reported as mean and standard deviation. Because the study contained one exposure-defined group and no comparison arm, findings are descriptive and do not estimate an independent association attributable to borderline AFI.

RESULT SUMMARY

All 80 enrolled participants were included in the final analysis. The largest age group was 21-25 years (30.00%); 78.75% were booked cases, and 56.25% were para 2. Complications during labour occurred in 30.00% and postpartum haemorrhage in 11.25%.

Outcome	n	%
Caesarean delivery	57	71.25
Vaginal delivery	23	28.75
Preterm delivery (<37 weeks)	33	41.25
Low birth weight (<2500 g)	41	51.25
Meconium staining	4	5.00
NICU admission	13	16.25
Neonatal complications	13	16.25
Congenital anomaly	1	1.25
Neonatal mortality	3	3.75

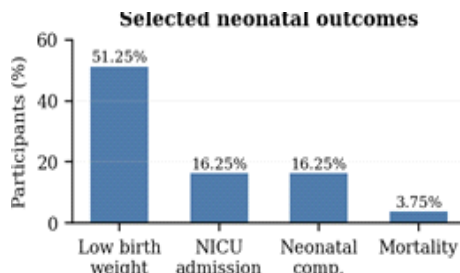
Figure 1. Distribution by mode of delivery



Caesarean section was the predominant mode of delivery. Among 57 caesareans, fetal distress was the most frequent indication (17; 29.82%), followed by failure to progress (16; 28.07%), non-reassuring NST (13; 22.81%) and previous LSCS recorded in the dataset (11; 19.30%). Term delivery occurred in 58.75%, while 41.25% delivered before 37 weeks.

Mean birth weight was 2480 $\pm$ 217 g. Low birth weight occurred in 51.25%. At one minute, Apgar scores of 8, 9 and 10 were each observed in 20.00%; at five minutes, 78.75% scored 10 and 12.50% scored 9. NICU admission and neonatal complications each occurred in 16.25%. Recorded complications included birth asphyxia (n=5), neonatal jaundice (n=4), sepsis (n=2) and respiratory distress (n=2). Three neonatal deaths (3.75%) were attributed to severe birth asphyxia, prematurity-related complications and neonatal sepsis, respectively.

Figure 2. Selected neonatal outcomes



DISCUSSION

This prospective cohort of 80 pregnancies with borderline AFI showed a high proportion of caesarean delivery, with fetal distress and non-reassuring NST together accounting for more than half of operative indications. Jamal et al. reported a higher caesarean rate, particularly for non-reassuring fetal heart rate, among borderline-AFI pregnancies compared with normal AFI [5]. Similar operative-delivery patterns were described by Bhargale and Kose [6], while recent pooled evidence found increased odds of caesarean delivery and caesarean delivery for fetal distress [8].

Reduced fluid volume can permit intermittent umbilical-cord compression and may also reflect limited placental reserve. These mechanisms provide a plausible explanation for intrapartum fetal-heart-rate abnormalities. However, intervention may also be influenced by clinicians' awareness of a low-normal AFI. Without a normal-AFI comparison group, the present study cannot distinguish biological risk from referral patterns, population characteristics or management thresholds.

Preterm delivery occurred in 41.25% of the cohort. Prior studies have also reported earlier delivery or increased intervention in borderline-AFI pregnancies [5,8], though timing of AFI measurement and local obstetric practice differ substantially. Most women in the present study nevertheless reached term, suggesting that carefully selected patients can continue under close surveillance.

Low birth weight was the most prominent neonatal finding, affecting 51.25%, with a mean birth weight of 2480 g. This is compatible with the hypothesis that reduced fluid may coexist with subclinical placental dysfunction, although birth weight is also influenced by gestational age, maternal nutrition and other unmeasured factors. Studies from India and elsewhere have reported variable relationships between borderline AFI and low birth weight [7,9-11].

Immediate neonatal adaptation was generally favourable: 91.25% had a five-minute Apgar score of 9 or 10. Meconium staining was

uncommon (5.00%). Nevertheless, 16.25% required NICU admission and the same proportion developed a neonatal complication. These findings support preparedness for neonatal observation, while the predominance of high five-minute Apgar scores indicates satisfactory recovery for most neonates.

Neonatal mortality was 3.75%, with individual deaths related to birth asphyxia, prematurity and sepsis. These serious events should be interpreted cautiously because the absolute number was small and the design provides no background rate for otherwise comparable pregnancies. The study is best read as a descriptive account of the clinical burden within an exposure-defined cohort rather than proof that borderline AFI caused the observed outcomes.

CONCLUSION

In this tertiary-care cohort, pregnancies with borderline AFI were characterised by frequent caesarean delivery and a notable burden of preterm birth and low birth weight. Most neonates achieved favourable five-minute Apgar scores, but a clinically important minority required NICU admission or experienced complications. Borderline AFI should prompt careful antenatal follow-up, continuous intrapartum fetal surveillance where appropriate, and readiness for neonatal support. Controlled prospective studies are needed before the independent risk attributable to borderline AFI can be quantified.

Limitations

The study was single-centre, used convenience sampling, included only 80 participants and had no normal-AFI comparison group. Follow-up was limited to the immediate perinatal period. Potential confounders were not adjusted statistically, and the recorded previous-LSCS indication is inconsistent with the stated exclusion criterion and should be reconciled against source records before submission.

Clinical Implications

Borderline AFI should be treated as a surveillance signal rather than an automatic indication for delivery. Decisions should integrate gestational age, fetal growth, fetal movement, cardiotocography or NST findings, maternal risk factors and the overall clinical picture.

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