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**Original Research Article**

# Relationship between the amniotic fluid index at term and the perinatal outcome

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## ABSTRACT

**Background:** Amniotic fluid index (AFI) is commonly used to estimate amniotic fluid volume. A proper AFI is between 10 and 24 centimetres. If it is below 5 cm, it is can represent oligohydramnios, and in case AFI is above 24 cm, it can represent polyhydramnios. This study was undertaken to determine whether measuring AFI at term is useful in the prediction of perinatal outcome.
**Methods:** A prospective study of 250 pregnant women with gestational age between 37 and 42 weeks was conducted at Sola Civil Hospital. AFI was measured in each patient using the Phelan's technique and the perinatal outcome was studied. The results were analysed and presented in the form of tables and graphs.
**Results:** Total 250 patients were studied. Out of them, 33 patients (13.2%) had AFI <=5, 215 (86%) had AFI between 6 and 24; and 2 patients (0.8%) had AFI >=25.19 out of 33 (57.57%) patients with AFI <= 5, had to undergo caesarean section, out of which, 12 caesarean sections (63.15%) were taken for non-reassuring foetal status. 36.27% (78/215) of patients with AFI between 6 and 24 underwent caesarean section, out of which 38.46% (30/78) underwent caesarean section for non-reassuring foetal status.
**Conclusions:** In the presence of oligohydramnios, the rates of LSCS due to foetal distress, the occurrence of low Apgar score and of low birth weight are higher than in patients with normal liquor at term. Thus, measuring the amniotic fluid index at term can be helpful in the prediction of perinatal outcome.

**Keywords:** Amniotic fluid index, Caesarean section, Perinatal outcome, Phelan's technique, Term pregnancy

## INTRODUCTION

Amniotic fluid is a transparent fluid surrounding the foetus.[1] Amniotic fluid provides a protective milieu for the growing foetus, cushioning it against mechanical and biological injury.[2,3] Amniotic fluid index (AFI) is commonly used to estimate amniotic fluid volume. A proper AFI is between 10 and 24 centimetres.[4] If it is below 5 cm, it is can represent oligohydramnios, and in case AFI is above 24 cm, it can represent polyhydramnios.[5,6] According to an investigation conducted by Morris et al, AFI <5 was positively correlated with asphyxia, C-section, low Apgar score and a pH>7 of the umbilical cord. They also reported a positive correlation between AFI <5 and lengthened pregnancy and, therefore, suggested AFI for predicting prenatal problems.[7] Objective of this study was to determine whether measuring the amniotic fluid index at term is useful in the prediction of perinatal outcome.

## METHODS

A prospective study of 250 pregnant women with gestational age between 37 and 42 weeks, who came to the labour room with true labour pains, from 1st April 2019 to 31st August 2019, was conducted at Sola Civil Hospital, Sola, Ahmedabad, India. The women's history and clinical examination were recorded. The AFI was measured in each patient using the Phelan's technique and the perinatal outcome was studied.[8]

The perinatal outcome in terms of Meconium stained liquor, total number of LSCS done due to foetal distress, foetal birth weight, Apgar score at 1 minute and 5 minute, and NICU admissions within 24 hours, were noted. The results were analysed and presented in the form of tables and graphs.

### *Inclusion criteria*

- Pregnant women with a singleton, non-anomalous foetus with gestational age between 37 and 42 weeks, who presented to the labour room with true labour pains with intact membranes in per vaginal examination, were included.

### *Exclusion criteria*

- Women with known foetal or chromosomal anomalies, and/or placental anomalies were excluded from the study.
- Women with PROM, gestational diabetes, Rh incompatibility and/or multiple pregnancies, were excluded from the study.

### *Statistical analysis*

Statistical analyses were performed using SPSS version 16.0 software (SPSS Inc, Chicago, IL). One-way analysis of variance (ANOVA) and Pearson's correlation tests were used in the statistical analysis.

## RESULTS

Total 250 patients were studied. Out of them, 33 patients (13.2%) had AFI <=5, 215 (86%) had AFI between 6 and 24; and 2 patients (0.8%) had AFI >=25 (Table 1).

The mean age of the patients with AFI less than or equal to 5, between 6 to 24, and greater than 25 is 26.5 years, 26.8 years and 27.5 years, respectively (Table 2).

Total number of nulliparous patients with AFI <= 5, AFI 6 to 24 and AFI >=25, are 22 out of 33 (66.67%); 128 out of 215 (59.53%); and 1 out of 2 (50%), respectively (Table 2).

**Table 1: Distribution according to AFI.**

| AFI | No. of patients (n) | Percentage |
|---|---|---|
| <= 5 | 33 | 13.2% |
| 6-24 | 215 | 86% |
| >=25 | 2 | 0.8% |
| Total | 250 | 100% |

**Table 2: Distribution according to the mean maternal age and number of nulliparous patients.**

| AFI | Mean maternal age (in years) | No. of nulliparous patients |
|---|---|---|
| AFI <= 5 | 26.5 | 22 (66.67%) |
| AFI 6-24 | 26.8 | 128 (59.53%) |
| AFI >=25 | 27.5 | 1 (50%) |

A total 19 out of 33 (57.57%) patients with AFI <= 5, had to undergo caesarean section, out of which, 12 caesarean sections (63.15%) were taken for non-reassuring foetal status. 36.27% (78/215) of patients with AFI between 6 and 24 underwent caesarean section, out of which 38.46% (30/78) underwent caesarean section for non-reassuring foetal status (Table 3; row number 1 and 2).

Birth weight of less than 2.5 kg was observed in 54.54% of patients with AFI <=5, whereas it was observed in 21.86% of patients with AFI between 6 and 24 (Table 3; row number 4).

Apgar score at 1 minute was less than 7 in 36.36% of the patients with AFI<=5 and 10.69% of the patients with AFI between 6 and 24 (Table 3; row number 5).

Apgar score at 5minutes was less than 7 in 6.06% of patients with AFI <=5 and 4.18% of patients with AFI between 6 and 24. (Table 3; row number 6). NICU admissions were observed in 84.84% of patients with AFI <= 5 and in 69.30% of patients with AFI between 6 and 24 (Table 3; row number 7).

**Table 3: Various perinatal outcomes according to the AFI of the patients.**

| Row number | Parameter | AFI<=5 (n=33) | AFI 6-24 (n=215) | AFI>=25 (n=2) |
|---|---|---|---|---|
| 1 | Total number of caesarean deliveries | 19 (57.57%) | 78 (36.27%) | 0 (0%) |
| 2 | Number of Caesarean for non-reassuring foetal status | 12 (63.15%) | 30 (38.46%) | 0 (0%) |
| 3 | Meconium stained liquor | 5 (15.15%) | 34 (15.8%) | 0 (0%) |
| 4 | Birth weight <2.5 kg | 18 (54.54%) | 47 (21.86%) | 0 (0%) |
| 5 | Apgar score at 1 minute less than 7 | 12 (36.36%) | 23 (10.69%) | 0 (0%) |
| 6 | Apgar score at 5 minutes less than 7 | 2 (6.06%) | 9 (4.18%) | 0 (0%) |
| 7 | Admission to NICU | 28 (84.84%) | 149 (69.30%) | 0 (0%) |

## DISCUSSION

In this study, the percentage of caesarean sections due to non-reassuring foetal status were higher in patients with AFI <=5, as compared to the patients with normal AFI. This was consistent with the findings by Chauhan et al, where their meta-analysis found that intrapartum AFI less than 5 was associated with increased risk of cesarean section for fetal distress (pooled relative risk = 1.7).[9]

In this study, the percentage of caesarean sections due to low birth weight, were higher in patients with AFI<=5, as compared to the patients with normal AFI. These findings are similar to study by Locatelli et al, reported that in uncomplicated term pregnancies with oligohydramnios, the presence of an AFI less than 5 independently increased the risk for a SGA infant.[10] Morris et al, found that 60% of babies were of LBW in the group with AFI less than 5, indicating that oligohydramnios had an association with growth restriction.[11] A study by Rutherford et al, showed that when the AFI was less than 5 (36%), pregnancies resulted in infants with intra uterine growth restriction (IUGR).[12]

The percentage of foetus with meconium stained liquor were similar (~ 15%) in Patients with AFI <=5 and AFI 6 to 24. A study conducted by Baron et al, showed that meconium stained amniotic fluid occurred significantly less often in the oligohydramnios group as compared to the normal AFI group.[13] So, this study had different results as compared to this study. Many authors signified high ratios of meconium staining with AFI measurements below 5 cm.[14-16] A study by Voxman et al, concluded that there was no difference between the groups with regard to meconium-stained liquor, which has results similar to this study.[17]

Apgar score at 1 minute was less than 7 in 36.36% of the patients with AFI<=5 and 10.69% of the patients with AFI between 6 and 24. Apgar score at 5minutes was less than 7 in 6.06% of patients with AFI <=5 and 4.18% of patients with AFI between 6 and 24. A study by Grubb et al, found the 1 minute Apgar score of less than 7 in 84% patients with AFI less than 5, as compared to 14% in the normal AFI group, which was highly significant (p=0.01).[18] In the same study, the 5-min score <7 was seen in 13% patients with AFI less than 5, versus 5% in the normal AFI group.

NICU admissions were much higher (84.84%) in patients with AFI <= 5 than the patients with AFI between 6 and 24 (69.30%).

## CONCLUSION

In the presence of oligohydramnios, the rates of LSCS due to foetal distress, the occurrence of low Apgar score and of low birth weight are higher than in Patients with normal liquor at term. However, there was no difference in the perinatal outcome in terms of meconium staining. The percentage of NICU admissions within 24 hours was much higher in the presence of oligohydramnios. Thus, measuring the amniotic fluid index at term can be helpful in the prediction of perinatal outcome.

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