

## Relation of Intrapartum Amniotic Fluid Index to Perinatal Outcome

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### ABSTRACT

**Objectives:** Our objective was to evaluate the usefulness of intrapartum amniotic fluid index (AFI<5) for prediction of fetal distress during labour and subsequent fetal morbidity.

**Methods:** This Descriptive type of observational study was conducted in Sevayatan Maternity And General Hospital, Jaipur over a period of two years (January 2014 December 2015) on 200 booked antenatal women at term (37-42 weeks), admitted for delivery with labour pain. All eligible patients fulfilling inclusion criteria and exclusion criteria were selected for this study. The women's history, clinical examination recorded, and AFI were measured. Cases were categorized into different groups depending on the value of AFI. Oligohydramnios-AFI  $\leq$  5cm (n =39), borderline-AFI 5.1-8 cm (n =43) and normal-AFI 8.1-24 cm (n =118). These three groups were compared with regard to intrapartum and postpartum variable.

**Results:** The cesarean section rate for fetal distress and low birth weight babies, <2.5 kg, was higher in patients with oligohydramnios. Thick meconium stained amniotic fluid was found high (46.15%) among oligohydramnios group of women. Thus, presence & nature of meconium stained liquor was significantly associated with AFI (P value< 0.001). The difference in the value of APGAR scores at 1 min and 5 min was statistically significant between oligohydramnios and normal amniotic fluid volume group. The incidence of NICU admissions was high among oligohydramnios group (48.72%) and borderline group (6.98%).

**Conclusions:** Intrapartum assessment of amniotic fluid index is better than antepartum fetal assessment, as an immediate evaluation of current fetal condition can be done. AFI when used as an "admission test" in intrapartum period can categorise the fetuses into "high risk" and "low risk" depending on their susceptibility to fetal distress. Oligohydramnios has a significant correlation with high incidence of thick meconium stained liquor, fetal distress, operative delivery and cesarean section for fetal distress, poor APGAR score, low birth weight, meconium aspiration and perinatal mortality.

**Keywords:** Intrapartum AFI, Meconium Staining, Cesarean Delivery, Apgar Scores, Birth Weight, NICU Admission.

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### INTRODUCTION

Amniotic fluid acts like a cushion and helps in growth of fetus in sterile environment, regulates temperature, avoid external injury and reduce impact of uterine contractions. Usual amount of amniotic fluid is approximately 1000ml at term. Volume of amniotic fluid decreases with increasing gestational age. Decrease in amniotic fluid volume is called as oligohydramnios.<sup>1</sup>

Fetal distress in labour is a common occurrence and is of great concern for both patient and the physician. Cardiotocography for 20 minutes (NST) and response to vibroacoustic stimulation have been used as admission tests.<sup>2</sup>

Another variable that has got great impact on the fetal condition in the intrapartum period is "Amniotic Fluid Volume". Quantification of amniotic fluid is an important component of the biophysical profile in ultrasound evaluation of fetal well-being, especially in the third trimester.<sup>3</sup> Modified biophysical profile is an excellent means of fetal surveillance and identifies a group of patients at increased risk for adverse perinatal outcome and small gestational age.<sup>4</sup> The incidence of cesarean delivery for intrapartum fetal distress progressively increased coincidentally with severity of variable decelerations and diminished amniotic fluid volume.<sup>6</sup>

Ultrasound being a noninvasive test is ideal for application on a large scale and can be used frequently for repeat AFV determination in the case of suspected abnormalities.<sup>4</sup>

"Amniotic fluid index" was described by Phelan in 1987. It is the most accurate method for assessing amniotic fluid volume, and helps categorise the patients into normal, low normal and oligohydramnios groups.<sup>5</sup> In the present study, amniotic fluid quantification was done by the four quadrant technique as described by Phelan et al<sup>7</sup> to determine AFI.

In this study, the three groups (normal, low normal and oligohydramnios) were compared with regard to intrapartum and postpartum variable. USG examination including measurement of AFI as an "admission test" for women presenting at labor ward, after an uneventful pregnancy, could identify patients at risk of fetal distress and thus detect cases needing "SPECIAL SURVEILLANCE". This is superior to the antepartum risk assessment because an immediate evaluation of the current fetal condition could be obtained.<sup>2</sup>

## MATERIALS AND METHODS

The present study was a Descriptive type of Observational study carried out at Sevayatan Maternity & General Hospital, Jaipur. The study participants included 200 booked antenatal women registered at Sevayatan Hospital with gestational age between 37 and 42 weeks, admitted for delivery over 2-year duration from Jan 2014 to Dec 2015.

### Inclusion Criteria

Pregnant women with gestational age more than 37 wks and less than 42 wks, Singleton pregnancy with true labor pains, AFI assessed by ultrasound, Cephalic presentation, Non anomalous

fetus with intact membranes at the time of antepartum testing, after given informed written consent

### Exclusion Criteria

Gestational age < 37 wks and > 42 wks, known fetal malformations, ruptured membranes, multifetal pregnancy, congenital anomalies of fetus, polyhydramnios (i.e. Cases with AFI > 24 cm), abnormal presentation (breech, transverse lie, oblique lie), previous LSCS, medical complications like diabetes mellitus, pregnancy induced hypertension, anemia, chronic nephritis, cardiac disease etc.

On admission, a detailed history was taken, and a clinical exam was performed and gestational age assessed. Amniotic fluid index was determined by ultrasonography (Phelan's technique/Four quadrant technique) at the onset of labor after informed written consent. Non stress test (NST) was performed for all patients. Cases were categorized into different groups depending on the value of AFI.

**Oligohydramnios:** AFI ≤ 5cm,

**Borderline:** AFI 5.1-8 cm,

**Normal:** AFI 8.1-24 cm.

These three groups were compared with regard to intrapartum and postpartum variable. Various outcome measures recorded were:-Nature of amniotic fluid, mode of delivery, indication for cesarean section/ instrumental delivery, APGAR score at 1 min and 5 min, birth weight, admission to neonatal ward and perinatal mortality.

Chi square ( $\chi^2$ ) test was carried out at 5% ( $\alpha = 0.05$ ) level of significance to test the homogeneity of the groups with respect to the distribution of patients over different classes of a characteristic of interest of Obstetric and perinatal outcome

**Table 1: Outcome parameters in study population**

Outcome parameters	Oligohydroamnios group		Boderline AFI group II		Normal AFI group III	
	Number of patients	%	Number of patients	%	Number of Patients	%
Thick meconium stained liquor	18	46.15	3	6.98	6	5.08
Instrumental / Assisted delivery	4	10.26	6	13.95	4	3.39
LSCS	28	71.79	10	23.26	12	10.17
LSCS for fetal Distress	24	61.53	9	20.93	9	7.63
APGAR <7 at 1min	23	58.97	12	27.91	5	4.24
5 min	16	41.03	7	16.28	3	2.54
Birth weight <2.5 Kg	14	35.90	8	18.60	6	5.08
Admission to neonatal ward	19	48.72	3	6.98	3	2.54
Neonatal death	2	5.13	-	-	-	-

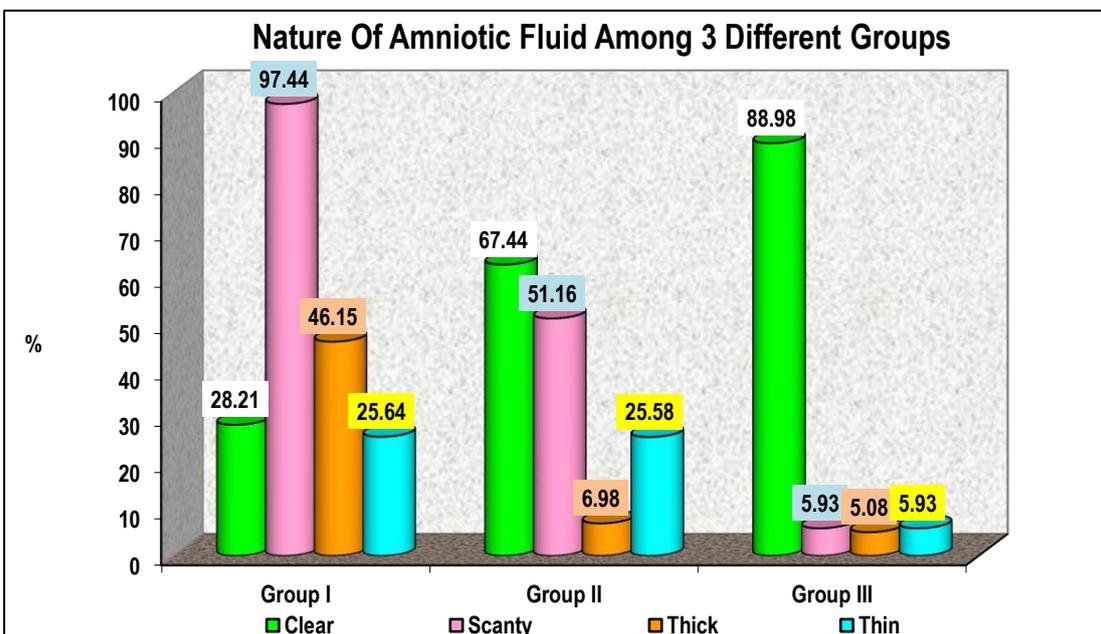
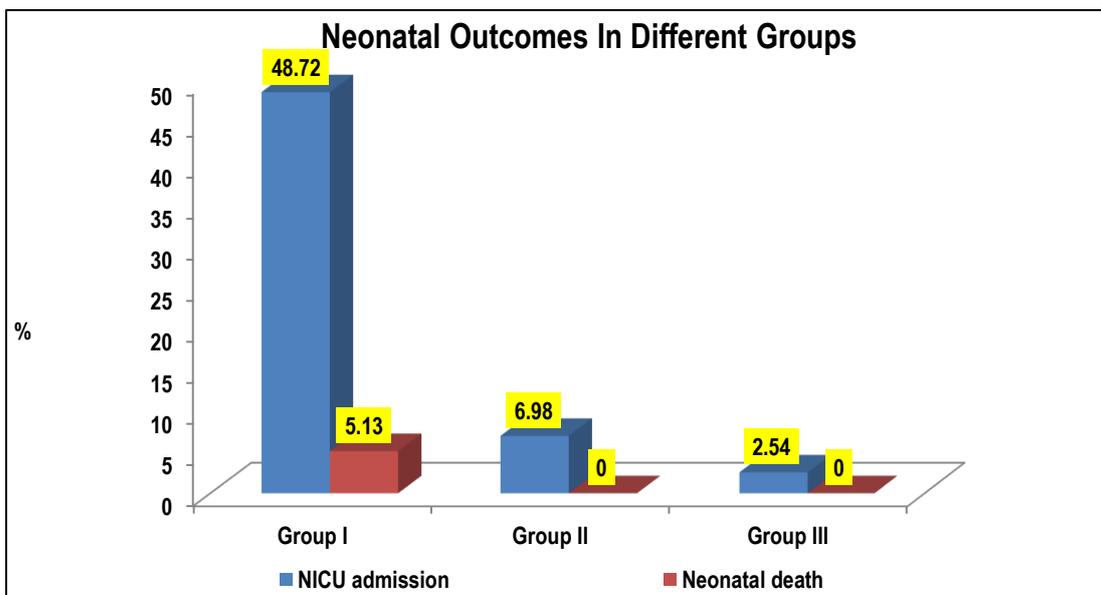
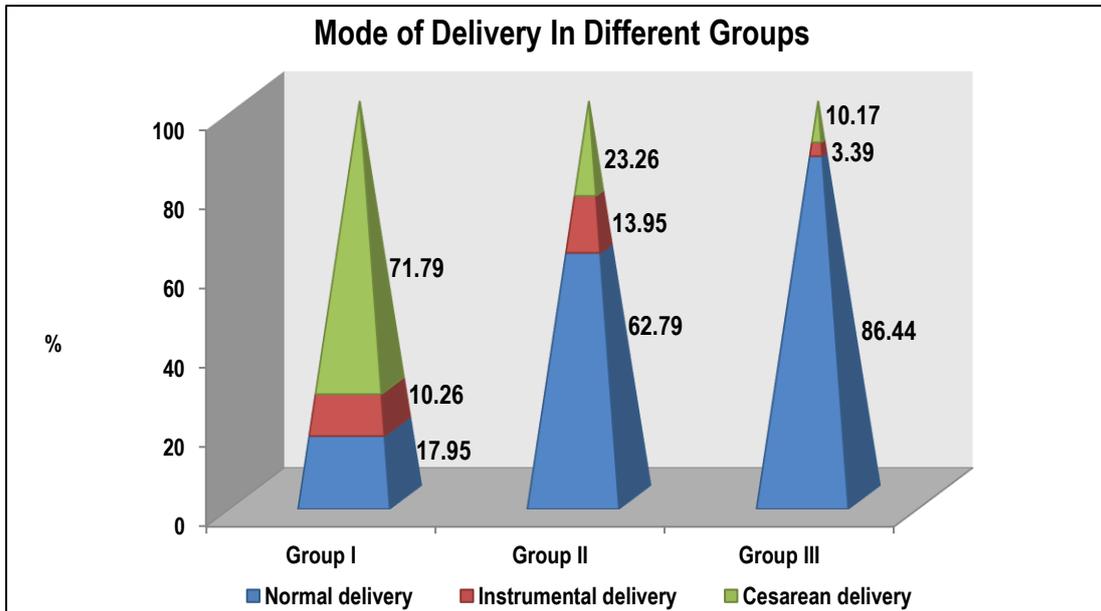
## RESULTS

Out of the 200 women, 19.5% of women were in oligohydramnios group, 21.5% in borderline group and 59% in normal group. Amniotic fluid volume is known to reduce with advancing gestational age. In the present study, 66.67% of women among oligohydramnios group, 53.49% among borderline group and 18.64% among normal group were of gestational age 40-42 weeks. On application of chi-square test, gestational age was significantly associated with AFI.

It was found that thick meconium stained amniotic fluid was high (46.15%) among oligohydramnios group of women, as cord compression was more common among them compared to other group. Thick meconium stained amniotic fluid was found in 6.98%

of women among borderline group and 5.08% of women among normal group. On application of chi-square test, presence & nature of meconium stained liquor was significantly associated with AFI (P value < 0.001).

Among the 39 women in oligohydroamnios group, 17.95% had normal delivery, 10.26% instrumental and 71.79% cesarean delivery. In the 43 women in borderline AFI group, 62.79% had normal delivery, 13.95% instrumental and 23.26% cesarean. Among the 118 women in normal AFI group, 86.44% had a normal delivery, 3.39% instrumental and 10.17% cesarean. On application of chi-square test, the difference in the mode of delivery was found to be statistically significant between three groups ( $p < 0.001$ ).



Hence, the emergency cesarean for fetal distress was high (61.53%) among oligohydramnios group. It was found that incidence of instrumental delivery was 10.26% among oligohydramnios and 13.95% among borderline group.

It was found that determination of AFI can be used as a screening test to predict cases of fetal distress during intrapartum period requiring LSCS with sensitivity 57%, specificity 91%, positive predictive value 62% and negative predictive value 89%.

Low APGAR score was seen at 1min in 58.97% and at 5 min in 41.03% of cases among oligohydramnios group. The difference in the value of APGAR scores at 1 min and 5 min was statistically significant between oligohydramnios and normal amniotic fluid volume group.

Low birth weight (< 2.5 kg) was seen more in oligohydramnios group (35.90%) and borderline group (18.6%) which signifies the relationship between amniotic fluid volume and the birth weight.

The incidence of NICU admissions was high among oligohydramnios group (48.72%) and borderline group (6.98%). Most common indication being birth asphyxia and meconium aspiration. There were 2 early neonatal deaths in the whole study. Both deaths were in oligohydramnios group with a birth weight < 2.5kg, the causes being Hypoxic Ischaemic Encephalopathy in one and Meconium Aspiration Syndrome in another.

## DISCUSSION

In the present study the incidence of thick meconium stained liquor was high among oligohydramnios group accounting for 46.15% of women and is comparable with the study conducted by Preshit Chate et al<sup>8</sup> (2013) 46.0% incidence. The studies by Rutherford et al<sup>9</sup> (1987) showed 54% incidence, Sarno et al<sup>2</sup> (1990) showed 41.9%, and Raj Sriya et al<sup>10</sup> (2001) showed 38.88% incidence of thick meconium stained amniotic fluid in the oligohydramnios group .

In the present study among oligohydramnios group, incidence of cesarean delivery for fetal distress was 61.53%. This is comparable with the study conducted by P. Supriya et al<sup>11</sup>, (63.6%). The incidence in the other studies conducted by Bhagat Megha et al<sup>12</sup>, was 57.4%, Sarno et al<sup>2</sup>, was 11.9% and Raj Sriya et al<sup>10</sup> was 43.05%.

In the present study among borderline group 20.93% of women had fetal distress, 7.63% of women in normal group had fetal distress which is comparable with the study conducted by Raj Sriya et al.<sup>10</sup>, (2001).

In the present study APGAR score < 7 at 1 min was seen in 58.97% of cases among oligohydramnios group, This is comparable with the study conducted by P. Supriya et al<sup>11</sup> (48.5%) and it was seen in 30% of cases in the study conducted by Rutherford et al., and 38.88% in the study conducted by Raj Sriya et al<sup>10</sup>, 26.2% by Sarno et al. Incidence of low APGAR score at 1 min in the borderline and normal group was 27.91% and 4.24% which is comparable with the study done by P. Supriya et al<sup>11</sup> but not comparable with the studies by other authors.

In the present study APGAR score < 7 at 5 mins was seen in 41.03% of cases among oligohydramnios, 16.28% among borderline group. Among normal group 2.54% women had APGAR score <7 at 5 mins which is comparable with the study conducted by Rutherford et al.<sup>9</sup>, (2%) and P. Supriya et al<sup>11</sup> (2.56%).

In the present study incidence of low birth weight was 35.9% in oligohydramnios group and 5.08% in normal group; 58.38% & 36.11% respectively in the study conducted by Raj Sriya et al.<sup>10</sup>, (2001); 62 % & 56% in oligohydramnios group in the study conducted by Preshit Chete et al<sup>8</sup> and Bhagat Megha et al<sup>12</sup> respectively and 51.51% & 5.12% in oligohydramnios group and normal group respectively in the study conducted by P Supriya et al<sup>11</sup>.

In the present study the incidence of NICU admissions among oligohydramnios group was 48.72% which is comparable with study done by P. Supriya et al<sup>11</sup>, 51.51%. But, in the studies conducted by Raj Sriya et al<sup>10</sup>, it was even more higher, 88.88%. Incidence of NICU admissions among borderline group was 6.98% and 15.38% in the study conducted by P. Supriya et al<sup>11</sup>. In the present study the incidence of NICU admissions was 2.54% in the normal group and 3.84% in the study by P. Supriya et al<sup>11</sup>, and 52.8% in the study by Raj Sriya et al<sup>10</sup>.

## CONCLUSIONS

Intrapartum AFI gives idea of early detection of fetal distress so that appropriate management accordingly could be prompted fast. Hence, decision between vaginal delivery and caesarean section should be well balanced. Timely intervention can reduce perinatal morbidity and mortality. There are very few trials on " Intrapartum AFI and risk associated", so larger trials are needed in this regard.

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