

**EVALUATION OF AMNIOTIC FLUID VOLUME AND ITS RELATION TO PERINATAL OUTCOME**Urmila Tripathi<sup>1</sup>, Neha Khatod<sup>2</sup>, Veena Agrawal<sup>3</sup>**HOW TO CITE THIS ARTICLE:**

Urmila Tripathi, Neha Khatod, Veena Agrawal. "Evaluation of Amniotic Fluid Volume and its Relation to Perinatal Outcome". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 37, May 07; Page: 6451-6455, DOI: 10.14260/jemds/2015/937

**ABSTRACT: BACKGROUND:** Amniotic fluid is an indicator of placental function on the fetal development. The AFI is the most commonly used method of measuring amniotic fluid. **AIMS:** We aimed to study the amniotic fluid volume in pregnancies beyond 34 weeks of gestation and to evaluate the predictive value of amniotic fluid index (AFI <5cm) for adverse perinatal outcome in terms of labour inductions, fetal heart rate pattern, meconium staining, caesarean section, Apgar score and NICU admissions. **SETTING AND DESIGN:** This was a non-randomized comparative study carried out in the Department of Obstetrics and Gynaecology at Kamla Raja Hospital, Gwalior (M.P.). **METHODS:** This study was conducted on 100 antenatal patients with gestational age 34 weeks and above with a singleton, non-anomalous fetus who were divided into two groups based on their AFI as group A (AFI≤5cm) and group B (AFI>5cm) during one year from August 2013 to July 2014. The women's history, clinical examination recorded and AFI were measured using the Phelan's technique and the perinatal outcome compared between the two groups i.e. AFI≤5cm and >5cm. **STATISTICAL ANALYSIS USED:** Chi-square test was carried out at 5% ( $\chi=0.05$ ) level of significance to analyze the collected data for final outcome. **RESULTS:** Labour was induced in 30% in group A as compared to 18% in group B. Induction of labour was significantly less in cases with AFI>5 cm of same gestational age group. The non-reassuring fetal heart rate were recorded more often in group A i.e. AFI≤5 cm. The incidence of meconium staining in caesarean section and low 5 min Apgar score was higher in patients with oligohydramnios i.e. AFI≤5cm (p=0.015, 0.012, 0.027 respectively). There was no significant difference in NICU admissions and perinatal death between the two groups. **CONCLUSION:** Amniotic fluid index is a helpful tool in determining the high risk patients during labour and AFI≤5 cm is one of the indicators of comparatively poor perinatal outcome.

**KEYWORDS:** Meconium staining, cesarean section, Apgar scores, NICU admissions, fetal heart rate pattern.

**INTRODUCTION:** The modern obstetrics is concerned with the health and well-being of both the mother and the unborn child. Recognition of foetus at risk for death or damage in utero, quantifying the risk, balancing the fetal risk against the risk of neonatal complications from immaturity and determining the optimal time and mode of intervention are the cornerstones of modern perinatal medicine.

Clinical estimation of amniotic fluid volume is an important part of fetal assessment as variation in its amount has been related to a variety of pregnancy complications.

Quantification of amniotic fluid is an important component of the biophysical profile in ultrasound evaluation of the fetal well-being, especially in the third trimester.<sup>1</sup>

In pregnancy amniotic fluid surrounds the foetus and plays an important role in the development of fetus.

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The volume of amniotic fluid at each week is variable and is positively correlated with the growth of fetus. From the 10th to 20th week it increases from the 25ml to 400ml approximately. From the 8th week when the fetal kidneys begin to function, fetal urine also contributes in the formation of the amniotic fluid. Approximately in the 10th week the breathing and swallowing of the fetus slightly decrease the amount of amniotic fluid but neither urination nor swallowing contributes significantly to amniotic fluid quantity changes. Until the 25th weeks when keratinization of skin is complete then the relationship between the amniotic fluid and the fetal growth stops. It reaches the plateau of 800 ml at 40 week. The amount of fluid declines to roughly 250 ml at 42 weeks.

Assessment of amniotic fluid volume at term is often included in antepartum care as a method of evaluating fetal well being.

Alterations in AFI have classically been considered as an indicator of fetal compromise.

In the present study we will reevaluate the relationship between amniotic fluid volume and perinatal outcome and to study the predictability of AFI as marker of perinatal outcome.

**MATERIAL AND METHODS:** The present study was a non-randomized comparative study carried out in the Department of Obstetrics & Gynaecology at Kamla Raja Hospital, Gwalior (M. P.) in a total span on one year i.e. August 2013 to July 2014. The study participants included 100 antenatal women at Kamla Raja Hospital with gestational age 34 weeks and above, admitted for delivery. They were divided into two groups based on their AFI: Group A, AFI  $\leq$ 5cm, Group B AFI >5cm.

Inclusion Criteria were all low risk pregnant women with gestational age of 34 weeks or more with a singleton, nonanomalous fetus with intact membranes at the time of antepartum testing who were willing to participate in the study.

Exclusion criteria were pregnant women with gestational age of less than 34 weeks, polyhydramnios, multiple pregnancy, placenta previa, fetal congenital anomalies, Patients with rupture membranes, Abnormal presentation and position and Pregnancy with medical disorders.

On admission a detailed history was taken and a clinical examination was performed and gestational age assessed. Amniotic fluid was determined using the Phelan's technique. Non stress test was done for every patient.

At the time of delivery the following variables were noted: nature of liquor: clear, thin or thick meconium, fetal heart rate monitoring, mode of delivery.

The end points used to judge perinatal outcome are: Fetal distress, 1 minute and 5 minute Apgar score, frequency of admission to NICU, perinatal death.

Chi square test was carried out at 5% ( $\chi=0.05$ ) level of significance to analyze the collected data for final outcome.

**RESULTS:** During the study period there were 50 women with AFI  $\leq$  5 cm and 50 women with AFI > 5 cm. in group A and group B respectively. Both were matched for inclusion and exclusion criteria.

Age (yrs)	AFI $\leq$ 5cm. (n=50)	AFI > 5cm. (n=50)
Maternal Age (Mean)	24.9	25
Gravidity	2.22	2.54
Gestational Age	37.92	38.02

Table 1: Maternal Demographic and obstetric characteristics

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Age (yrs)	AFI $\leq$ 5cm. (n=50)	AFI > 5cm. (n=50)	P value
No. of labour inductions	30 (60%)	18 (36%)	0.016
Total cesarean delivery	20 (40%)	8 (16%)	0.012
Thick meconeum staining	12 (24%)	6 (12%)	0.00015
Apgar score			
1 min <7	18 (36%)	6 (12%)	0.0027
5 min <7	16 (32%)	4 (8%)	
Non-reassuring FHR	18(36%)	6 (12%)	

**Table 2: Obstetric and Perinatal outcome**

	AFI $\leq$ 5cm. (n=50)	AFI > 5cm. (n=50)
Admission to NICU	10	6
Perinatal death	2	1

**Table 3: Secondary outcome measures**

AFI was measured in all cases and oligohydramnios was considered if AFI was less than 5 cm.

**The results were recorded, tabulated and statistically analyzed using parameters like mean and chi square test:**

- The mean age for study group A and group B was 24.98 and 24.96 respectively.
- Most of them were gravida 2 in both the groups. The mean gravidity was 2.22 in group A and 2.54 in group B.
- Only those pregnant women who were sure of their LMP were taken for study and all of them had completed 34 weeks of gestation. The mean gestational age for group A and group B were 37.92 weeks and 38.02 weeks respectively.
- The amniotic fluid index was measured by four quadrant semiquantitative technique by ultrasound and those with AFI  $\leq$ 5cm were considered as oligohydramnios and those with AFI  $\geq$  5cm were considered normal.
- Labour was induced in 30% in group A as compared to 18% in group B. Induction of labour was significantly less in cases with AFI  $\geq$ 5cm of same gestational age group.
- The non-reassuring FHR were recorded more often in group A i.e. AFI  $\geq$ 5 cm.
- Incidence of thick meconeum was 24% in group A as compared to 12% in group B. This was statistically significant (p=0.015).
- Incidence of LSCS was more in group A i.e. 20% as compared to group B i.e. 8%. This was statistically significant (p=0.012).
- The low 5 minute Apgar score was more in group A as compared to group B and this was statistically significant (p=0.027).
- NICU admission were more in group A i.e. 10 as compared to group B i.e. 6.
- There were 2 perinatal deaths in group A and 1 in group B and this was not statistically significant.

**DISCUSSION:** This study was carried out to determine and compare the usefulness of AFI in predicting the adverse perinatal outcome.

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The various outcomes and results were compared to results of similar studies done in India & abroad.

In the present study, The FHR decelerations, during intrapartum period suggestive of fetal distress were common in pregnant women with AFI  $\leq 5$ cm.

The ominous FHR pattern noted in 36% in present study is comparable to 48% and 36.1% in studies by Cassey et al<sup>2</sup> and Sriya R. et al<sup>3</sup> respectively.

Induction of labour was 60% in group A as compared to 36% in group B which is statistically significant ( $p = 0.016$ ) and this is consistent with the study done by Cassey et al<sup>2</sup> (42%).

The incidence of meconium stained amniotic fluid was higher in women with AFI  $\leq 5$ cm. The thick meconium stained liquor was noted in 24% in the study group A (AFI  $\leq 5$ cm.) which is similar to studies conducted by Rutherford et al (1987)<sup>4</sup> - 54% and Sriya R et al (2001)<sup>3</sup> - 38.88%. These are not consistent with study by Baron et al 1995 and this could be due to less number of women who had crossed 40 wks.

The cesarean rates were higher in group A (AFI  $\leq 5$ cm) i.e. 40% as compared to 16% for group B (AFI  $> 5$  cm) and the difference was statistically significant ( $p = 0.00015$ ).

Chauhan et al<sup>5</sup> in the meta-analysis (1999) found that intrapartum AFI  $\leq 5$ cm was associated with increased incidence of cesarean section specially for fetal distress, which was similar to our study.

Rutherford et al<sup>4</sup> found an inverse relationship between amniotic fluid index and cesarean section.

In the present study, the 1 minute Apgar score was  $< 7$  in 18% in group A, whereas only 6% babies in group 2 had a 1 minute Apgar score  $< 7$ .

The 5 minutes Apgar score was  $< 7$  in 16% in group A and 4% in group B and this difference was statistically significance ( $p = 0.0027$ )

Chauhan et al<sup>5</sup> reported in their meta-analysis that antepartum AFI of  $\leq 5$ cm was associated with a 5 minutes Apgar score  $< 7$ . (pooled RR - 1.8, 95% CI-1.1-2.6)

A study by Grubb et al<sup>6</sup> found that the 1 minute Apgar score  $< 7$  in 84% patients with AFI  $\leq 5$ cm as compared to 14% in the normal AFI group, which was highly significant ( $p = 0.01$ ).

In the same study the 5 minutes Apgar score  $< 7$  was seen in 13% patients with AFI  $\leq 5$ cm vs. 5% in the normal AFI group.

In the present study, the incidence of admission to NICU was 20% in group A as compared to 12% in group B and this is consistent with studies by Megann 1999<sup>7</sup> (7%) and Cassey et al<sup>2</sup> (7.6%) however the results is not consistent with studies by Sriya R et al (88%).<sup>3</sup> Thus in group A there was significant correlation to NICU admission.

Occurrence of perinatal death was 4% in oligohydramnios group comparable to 5% in a study by Cassey et al.<sup>2</sup>

### CONCLUSION:

- The above study concludes that amniotic fluid is a helpful tool in determining high risk patients during labour and AFI  $\leq 5$ cm is one of the indicators of comparatively poor perinatal outcome.
- The high statistical significance between low AFI and occurrence of non-reassuring FHR, LSCS for foetal distress and incidence of thick meconium stained liquor would help to identify patients who needs intensive monitoring during labour and may landup in emergency caesarean section.

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- So, AFI when used as an 'admission test' in intrapartum period can categorize the fetuses into 'high risk' and 'low risk' depending on their susceptibility to FD.
- In the presence of low AFI, the incidence of MSL, abnormal FHR, low Apgar score, rate of LSCS, NICU admissions and perinatal mortality are high. So determination of AFI can be used as an adjunct to other fetal surveillance methods to identify fetuses at risk of poor perinatal outcome.

### REFERENCES:

1. Bhagat Megha, Chawla Indu, Correlation of Amniotic Fluid Index with perinatal outcome. The Journal of Obstetrics and Gynecology of India. (Jan. To Feb. 2014) 64(1): 32-35.
2. Casey BM, MC Intire DD, Donald D, et al. Pregnancy outcome after diagnosis of oligohydramnios at or beyond 34 weeks of gestation. Am J Obstet Gynecol 2000; 182: 902-12.
3. Sriya R, Singhai S, et al. Perinatal outcome in patients with amniotic fluid index  $\leq$  5cm. J Obstet Gynaecol India 2001; 51(5): 98-100.
4. Rutherford SE, Jeffrey P, Phelan J, Smith CV, Jacobs N. The four quadrant assessment of amniotic fluid volume: An adjunct to antepartum fetal heart rate testing. Obstet Gynecol 1987; 70: 353.
5. Chauhan SP, Sanderson M. Perinatal outcome and amniotic fluid index in the antepartum and intrapartum period: A meta-analysis. Am J Obstet Gynaecol 1999; 181: 1473-8.
6. Grubb DK, Paul RH. Amniotic fluid index and prolonged antepartum fetal heart rate decelerations. Obstet Gynecol 1992; 79: 558-60.
7. Magann EF, Chouhan SP, Kinsella MJ, et al. Antenatal testing among 1001 patients at high risk: The role of ultrasonographic estimate of amniotic fluid volume. Am J Obstet Gynecol 1999; 180: 1330-1336.

### AUTHORS:

1. Urmila Tripathi
2. Neha Khatod
3. Veena Agrawal

### PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Obstetrics & Gynaecology, Gajra Raja Medical College, Gwalior, M. P.
2. Senior Resident, Department of Obstetrics & Gynaecology, Gajra Raja Medical College, Gwalior, M. P.

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3. Ex. Professor & HOD, Department of Obstetrics & Gynaecology, Gajra Raja Medical College, Gwalior, M. P.

### NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Urmila Tripathi,  
C-98, Govindpuri,  
Near Vice Chancellor's,  
Residence, Sachin Tendulkar Marg,  
Gwalior-474011, Madhya Pradesh.  
E-mail: urmilatripathi@gmail.com

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