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Amniotic Fluid Index and Perinatal Outcome in Term Pregnancy in Dhulikhel Hospital

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ABSTRACT

Introduction: Amniotic fluid index (AFI) is one of the parameter to assess fetal well-being. AFI is associated with peri-natal morbidity and even mortality. Studies showing peri-natal outcome of low AFI has not been done at Dhulikhel hospital so this study is conducted to find out the association of AFI with various adverse peri-natal outcomes in pregnancies beyond 37 weeks.

Methods: This is a prospective, comparative study in the department of Obstetrics and Gynecology of Dhulikhel Hospital from December 2016 to May 2017. All the pregnant ladies at term pregnancy meeting the inclusion criteria were taken for the study. AFI was measured and the perinatal outcome was compared between two groups, i.e., AFI < 8 and ≥ 8 .

Result: Out of 1084 pregnant ladies, there were 94 ladies in with AFI<8cm. Most of the ladies in the study groups were primi-gravida with the mean age being 24.25 ± 4.8 years. There were 62% cesarean section in group1; most common indication of cesarean section was fetal distress and meconium-stained liquor. 29.8% of newborns were admitted in neonatal intensive care unit for meconium aspiration syndrome. 10.6% of babies was born with low birth weight. There were two neonatal deaths in both groups due to hypoxic ischemic encephalopathy (HIE) - II.

Conclusion: AFI < 8 is associated with increased cesarean section deliveries for fetal distress and low birth weight babies.

Keywords: Amniotic Fluid Index, Meconium staining, Cesarean delivery, APGAR scores

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INTRODUCTION

Nature has made a floating bed in the form of amniotic fluid cavity filled with liquor amnii for the requirement of fetus. It provides growth in sterile environment regulates temperature, avoids external injury and reduces impact of uterine contractions.¹Liquor amnii is necessary for proper growth and development of the baby. It cushions the fetus from physical trauma, permits fetal lung growth and provides barrier against infections. Amniotic fluid volume can be measured by different methods, commonly using ultrasonography.²

Abnormal liquor volume can be expressed by means of Amniotic Fluid Index. The ultrasonographic observation of diminished amniotic fluid volume has long been recognized as a predictor of adverse perinatal outcome.³⁻⁵

American College of Obstetrics and Gynecology practice bulletin number 101 defined an AFI > 5 cm as consistent with normal amniotic fluid volume.⁶⁻⁷

Oligohydramnios is a clinical condition characterized by AFI of 5cm or less according to the criteria of Phelan et al.²Oligohydramnios can develop in any trimester, more in third trimester.⁸ In post-term pregnancies, placental insufficiency has been proposed as main factor to reduced amniotic fluid volume.⁹ Incidence varies widely, from 0.5%¹⁰ to 5%.¹¹ AFI is a predictor of fetal tolerance to labour, oligohydramnios is associated with increased risk of abnormal fetal heart rate, increased meconium-stained liquor and increased cesarean section rate.¹²

This study is conducted to find out the association of AFI less than 8 or 8 or more, with various adverse perinatal and maternal outcomes in pregnancies beyond 37 weeks.

METHODS

This is a prospective, comparative hospital based study. All the pregnant ladies with a singleton pregnancy at term coming to Dhulikhel Hospital for delivery in between December 2016 – May 2017 for induction of labour, at early stage of labour or for elective cesarean section with intact membranes were included in the study. AFI was estimated for all ladies included in the study by ultrasonography done by the investigator. Patients delivering within one week of AFI estimation were included in the

study. Pregnancy less than 37 weeks of gestation, patient with previous history of cesarean section, prelabour rupture of membrane, cases undergone amnio-infusion, amnio-reduction were excluded from the study. It's a single observer study where women were divided into two groups. Group1 with AFI <8 and Group 2 with AFI \geq 8. Comparison was done between the groups. Study variables selected were age, parity, period of gestation, mode of delivery, APGAR score, NICU admission. The data entry and analysis was done in SPSS and Chi square test was be used for comparison data. All data were analyzed by SPSS version 21 using appropriate statistical tools. Ethical clearance was taken from the hospital research committee (IRC-KUSMS-133/16 prior to the data collection.

RESULTS

The total number of cases in the study period was 1425 out of which 1084 cases were enrolled in the study meeting the inclusion criteria and 341 cases were excluded.

There were 94 cases in group 1 and 990 cases in group 2. Table 1 shows the number of women with different AFI in the two groups. 496 (45.7%) of the mothers were in the age group of 20-24 and 346 (31.9%) were of 25-29 years. 56.6% of the ladies were primigravida in both the groups. Oligohydramnios was more prevalent during 40-40+6 weeks of gestation. 62.7% ladies had undergone lower segment cesarean section in Group 1 compared to 15.7% in Group 2. There were 57.4%of meconium stain liquor in group 1 compared to 8.7% in Group 2 which was significant. Low birth weight <2.5kg was present in 10.6% in Group 1 compared to only 9.6% in Group 2. Maximum babies had birth weight of 2.5-3.9 kg in both the groups. In the5 min APGAR score, 5.1% had a score of4-6 in group 1 but in group 2 the score was in 0.9%. (Table 2)

Table 1. AFI of included patients

Group 1 (AFI< 8cm)	
AFI- 5 - 8cm	90
AFI- <5cm	4
Group 2 (AFI > 8cm)	990
TOTAL	1084

Table 2. Perinatal outcome in both groups

	Group 1 / AFI<8cm (n=94)	Group 2 / AFI≥8 cm (n=990)	P value
Mode of delivery			
Vaginal	31.9% (30)	81.1% (802)	
Caesarean	62%,(59)	15.7%,(156)	0.003
Instrumental	5.3% (5)	3.1%(31)	
Meconium stain liquor	57.4% (54)	8.7% (87)	0.003
Low Birth weight < 2.5	10.6%(10)	9.6%(95)	
2.5- 3.9	84(89.6%)	887(89.6%)	0.715
≥4kg	0(0%)	8(0.8%)	
APGAR score at 5min	5.31%	0.9%	0.003
NICU admission	29.8%(28)	4.84% (48)	0.0001

Table 3 .Parity distribution with AFI

Gravida	AFI		Total	p-value
	<8cm	> 8cm		
Primigravida	60(63.8%)	554(55.9%)	614(56.6%)	1.9
Multigravida	33(35.1%)	399(40.3%)	432(39.8%)	
Grand multipara	1(1.06%)	37(3.74%)	38(3.5%)	
Total	94(100%)	990(100%)	1084(100%)	

Table 4 . AFI with Period of Gestation Distribution.

Period of Gestation (POG)	AFI		Total	p-value
	<8cm(n)	>8cm(n)		
37-39+6	42(44.6)	615(62.1%)	657(60%)	0.009
40-41+6	48(51%)	352(35.5%)	400(36.9%)	
≥42	4(4%)	23(2.3%)	27(2.5%)	
Total	94(100%)	990(100%)	1084(100%)	

Group 1 had 57.4% meconium stained liquor compared to 8.7% in case of Group 2 p-value was significant (0.003).

Indication for NICU admission in both group were meconium aspiration syndrome, meconium stain liquor, birth asphyxia, neonatal jaundice, hypothermia, transient tachypnea of newborn and low birth weight.

DISCUSSION

The importance of amniotic fluid volume as an indicator of fetal wellbeing has made its assessment an important part of antenatal fetal surveillance. Abnormalities such as meconium staining, congenital

anomalies, growth restriction, dysmaturity and fetal asphyxia have been associated with reduced amniotic fluid volume. Keeping the above concept in mind the present study has been undertaken. In the study a total of 1084 pregnant ladies were enrolled and were divided in two groups , Group 1 with AFI <8 cm and Group 2 with AFI ≥8cm.

In this study most of the ladies were 20-24 years and 25-29 years in both groups. Study of Literature reveals that similar result were seen in study conducted by Nazlima et al where maximum number of cases belonged to same age group as that of present study.¹³

Oligohydramnios was more common in primigravida lady,¹⁴⁻¹⁵ which was similar to above study. Most of the ladies were in 40-40+6 weeks of gestation in group 1 but in group 2 most were in 39-39 weeks 6 days.

Considering induction of labour, in above study conducted at Dhulikhel hospital, cases under AFI less than 8cm had higher rate of induction of labour when compared with those with AFI more than 8cm. When mode of termination was looked upon, In Group 1 out of 94 cases 30(31.9%) had normal delivery, 5(5.3%) had instrumental delivery and 59(62.7%) had cesarean section, in Group 2 out of 990 cases, 803(81.1%) had Normal Delivery, 31(3.1%) had instrumental delivery, and 156(15.7%) had Cesarean Section. In Group 1 cesarean section rate was 62.7%, compared to 15.7% in case of Group 2. There was various reason associated with it. Cases with AFI less than 4 cm were directly taken for cesarean section assuming increasing intrapartum complications if induction was conducted. Thus overall cesarean section rate was higher in Group 1. Most common indication for cesarean section was severe oligohydramnios, fetal distress, malpresentation followed by failed induction. Coming to instrumental delivery, vacuum was only used instrument and group 1 had more number of instrumental delivery than group 2. All above results were comparable to several studies result.

Sarno et al found that intrapartum oligohydramnios was associated with an increased risk of cesarean section (c/s) indication mostly being fetal distress (FD).¹⁶ Another retrospective case-control study was performed at The Liverpool Maternity Hospital , showed a higher risk of induction for fetal reasons.¹⁷

In a study by Conway et al over a period from January 1993 to April 1996 183 women showed that labour induction is the common response to oligohydramnios in term gestations whether or not other risk factors are present. A greater proportion of women in the oligohydramnios group than in the control group underwent cesarean section (15.8% vs 6.6%). Of the 29 women in the oligohydramnios group who underwent cesarean section, 3 of 12(2%) had fetal distress. Failure to enter the labour after the induction contributed to 7.4% of the cesarean section in the oligohydramnios group.¹⁸

In a study conducted at Postgraduate Medical Institute,

Lady Reading Hospital Peshawar 15(36%) out of 39 cases ended in caesarean section and the majority of these were for fetal distress.¹⁹ Thus the result of the present study were statistically comparable with other different studies.

Passage of Meconium is considered normal in cases of post term pregnancies but its presence is also one of the sign of fetal distress. Taking this into mind colour of Amniotic Fluid was noted. In Group 1, out of 94, 40(42.36%) had clear amniotic fluid, 54(57.4%) had meconium stained liquor whereas in Group 2 out of 1084, 903(91.2%) had clear liquor whereas 87(8.7%) had meconium stained liquor. So Group 1 had more meconium stained liquor compared to Group 2. Meconium stained liquor was more observed in case of patients with borderline oligohydramnios. e with AFI 5-8 cm compared to those with severe oligohydramnios. e AFI less than 3cm. This might be due to more induction and trial of labour offered to borderline oligohydramnios group. The above results were statistically significant. Looking upon the literature review. In a study by Chamberlain et al with oligohydramnios meconium stained liquor was more often.²⁰ A prospective case control study of 50 cases with diagnosis of oligohydramnios showed increased incidence of Thick meconium stained liquor.²¹

Some of the contrast results when comparing with different literature reviews were.

Magnann et al concluded that no statistical difference were between the two groups in the risk of thick meconium stained amniotic fluid.²² Another study concluded that meconium stained amniotic fluid was identified less often in pregnancies complicated by oligohydramnios (6% vs. 15% p=0.004).²³

Birth weight distribution among different groups showed that 84(89.6%) in Group 1, 887(89.6%) in Group 2 had birth weight more than 2.5kg. This result wasn't statistically significant whereas 10(10.6%) in Group 1 had birth weight less than 2.5 kg compared to only 95(9.6%) case in Group 2, the result wasn't statistically significant. In group 2 there were 8(0.7%) newborn with weight more than 4 kg where as in group 1 there were no newborn of more than 4kg, this signifies that AFI of less than 8 will have IUGR

Some of the comparable results were found in other study. In a retrospective study there was fourfold risk of low birth weight (LBW) and high rate of admission

to NICU in case of oligohydramnios.¹⁷ Also in a prospective case control study concluded that in oligohydramnios group there were increased chances of birth weight less than 2.5kg.²⁴ In a retrospective study there was fourfold risk of low birth weight (LBW) and high rate of admission to NICU in case of oligohydramnios.¹⁷ The present study showed that, APGAR score more than 6 in one minute of life in group 1 is 86.2% and group 2 is 91%, APGAR score in between 4-6 in group 1 is 13.8% and group 2 is 9%, whereas APGAR score more than 6 in five minute of life in group 1 is 94.6% and group 2 is 99.1%, APGAR score in between 4-6 in group 1 is 5.31% and group 2 is 0.9%.

A comparative study done between 2 groups; AFI <5cm and AFI 5-8cm concluded that there was no difference with regard to 1 and 5 minutes Apgar score <7.²⁴ A prospective study by Magnann et al, concluded that there was no statistical difference in Apgar score <7 at 5 minute in normal and oligohydramnios group.²² Result was not comparable to the present study. Likewise in a metaanalysis performed showed that there was no any difference with regards to low Apgar score.²⁰ A prospective case control study concluded that in oligohydramnios group there were increased chances of low Apgar score at 5min.²¹ In a study conducted at Dhaka city hospital, it concluded that significant difference were seen when comparing oligohydramnios group to that of normal AFI group in regards to <7 Apgar score in 5 minute.²⁵

In the above study the NICU admission in Group 1 is 29.8% whereas in Group 2 it is 4.84%. NICU admission was more in group 1 than Group 2 this may be due to oligohydramnios. There were one NND due diaphragmatic hernia in group 2 and there were two babies shifted to NICU due to HIE stage II in both groups. After 5 -6 days of NICU admission both the babies had neonatal death.

CONCLUSION

The present study showed that AFI less than 8 cms at term is associated with various maternal morbidities, like increased caesarean section rates and meconium stained liquor. Low AFI is also associated with higher NICU admissions. So amniotic fluid assessment can be an important parameter in antepartum fetal assessment.

REFERENCES

1. Jagatia K, Singh N, Patel S. Maternal and fetal outcome in oligohydramnios-Study of 100 cases. *International Journal of Medical Science and Public Health*. 2013;2(3):724-7.
2. Phelan JP, Smith CV, Broussard P, Small M. Amniotic fluid volume assessment with the four-quadrant technique at 36-42 weeks' gestation. *The Journal of reproductive medicine*. 1987 Jul;32(7):540-2.
3. Ahmad H, Munim S. Isolated oligohydramnios is not an indicator for adverse perinatal outcome. *Journal of the Pakistan Medical Association*. 2009;59(10):691.
4. Chamberlain PF, Manning FA, Morrison I, Harman CR, Lange IR. Ultrasound evaluation of amniotic fluid volume: II. The relationship of increased amniotic fluid volume to perinatal outcome. *American journal of obstetrics and gynecology*. 1984 Oct 1;150(3):250-4.
5. Banks EH, Miller DA. Perinatal risks associated with borderline amniotic fluid index. *American journal of obstetrics and gynecology*. 1999 Jun 30;180(6):1461-3.
6. Manning FA, Platt LD, Sipos L. Antepartum fetal evaluation: development of a fetal biophysical profile. *American journal of obstetrics and gynecology*. 1980 Mar;136(6):787-95.
7. Koner H. DC Dutta's text book of Obstetrics. 7th ed. India: Jaypee; 2013; p. 215.
8. Park K. Park's Text Book of Preventive and Social Medicine. 20th ed. Jabalpur: Banarasi Das Bhanot; 2009: p. 479-83.
9. Ek S, Andersson A, Johansson A, Kublicas M. Oligohydramnios in uncomplicated pregnancies beyond 40 completed weeks. *Fetal diagnosis and therapy*. 2005; 20(3):182-5.
10. Hill LM, Breckle R, Wolfgram KR, O'Brien PC. Oligohydramnios: ultrasonically detected incidence and subsequent fetal outcome. *American journal of obstetrics and gynecology*. 1983 Oct;147(4):407-10.

11. Mercer LJ, Brown LG, Petres RE, Messer RH. A survey of pregnancies complicated by decreased amniotic fluid. *American journal of obstetrics and gynecology*. 1984 Jun 1;149(3):355-61
12. Oosterhof H, Haak MC, Aarnoudse JG. Acute maternal rehydration increases the urine production rate in the near-term human fetus. *American journal of obstetrics and gynecology*. 2000 Jul 31;183(1):226-9.
13. Nazlima N, Fatima B. Oligohydramnios at third trimester and perinatal outcome. *Bangladesh Journal of Medical Science*. 2012;11(1):33-6.
14. Gabbe SG, Niebyl JR, Galan HL, Jauniaux ERM, Landon MB, Simpson JL et al. *Obstetrics, Normal and Problem Pregnancies*. 6th ed. 2016:759-9.
15. Gita G, Shweth P, Arvind L, Shashi K. A prospective clinical study of feto-maternal outcome of pregnancies with abnormal liquor volume. *J Obstet Gynaecol India*. 2011;61(6):652-5.
16. Sarno Jr AP, Ahn MO, Phelan JP. Intrapartum amniotic fluid volume at term. Association of ruptured membranes, oligohydramnios and increased fetal risk. *The Journal of reproductive medicine*. 1990 Jul;35(7):719-23.
17. Roberts D, Nwosu EC, Walkinshaw SA. The fetal outcome in pregnancies with isolated reduced amniotic fluid volume in the third trimester. *Journal of Perinatal Medicine-Official Journal of the WAPM*. 1998;26(5):390-5.
18. Conway DL, Adkins WB, Schroeder B, Langer O. Isolated oligohydramnios in the term pregnancy: Is it a clinical entity?. *Journal of Maternal-Fetal and Neonatal Medicine*. 1998;7(4):197-200.
19. Jabeen S, Shafqat T, Ahmad S. Oligohydramnios Causes and Pregnancy Outcome-Third trimester versus Second Trimester and Significance of Amniotic Fluid Index (AFI). *Journal of Postgraduate Medical Institute (Peshawar-Pakistan)*. 2011 Jun 9;11(2).
20. Bhagat M, Chawla I. Correlation of Amniotic Fluid Index with perinatal outcome. *The Journal of Obstetrics and Gynecology of India*. 2014 Feb 1;64(1):32-5.
21. Hill LM, BRECKLE R, THOMAS ML, Fries JK. Polyhydramnios: ultrasonically detected prevalence and neonatal outcome. *Obstetrics & Gynecology*. 1987 Jan 1;69(1):21-5.
22. Magann EF, Kinsella MJ, Chauhan SP, McNamara MF, Gehring BW, Morrison JC. Does an amniotic fluid index of ≤ 5 cm necessitate delivery in high-risk pregnancies? A case-control study. *American journal of obstetrics and gynecology*. 1999 Jun 30;180(6):1354-9.
23. Bangal VB, Giri PA, Sali BM. Incidence of oligohydramnios during pregnancy and its effects on maternal and perinatal outcome. *Journal of Pharmaceutical and Biomedical Sciences (JPBMS)*. 2011;12(12).
24. Leeman L, Almond D. Isolated oligohydramnios at term: is induction indicated? *J Fam Pract*. 2005 Jan 1;54(1):25-32.
25. Rossi AC, Prefumo F. Perinatal outcomes of isolated oligohydramnios at term and post-term pregnancy: a systematic review of literature with meta-analysis. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2013 Jul 31;169(2):149-54.