ORIGINAL RESEARCH

Assessment of Neonatal Outcomes in Pregnant Women with Low Amniotic Fluid Index

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ABSTRACT
Background: The Amniotic fluid index (AFI) is a measurement used during pregnancy to assess the amount of amniotic fluid surrounding the baby in the uterus. The present study was conducted to assess low amniotic fluid index and its effect on perinatal outcome.**Materials & Methods:**90 antenatal females presenting with term pregnancy based upon AFI, were divided into three groups – group I with AFI<5 cm, group II with AFI≥5-8 cm and group III with AFI>8 cm. Maternal outcome and neonatal outcome were recorded.**Results:** In group I, group II and group III, Paritywas primiparain 15, 18 and 19 and multipara in 15, 12 and 11 patients respectively. Gestational age (weeks) found to be 37-38 in 13, 16 and 17 and 39-40 in 17, 14 and 13 patients respectively. Reason for admission was decreased AFIin 76, 72 and 4, safe confinement in 12, 11 and 5 and spontaneous onset of labour in 2, 7 and 81 patients respectively. Mode of delivery was FTVD in 14, 15 and 24, spontaneous induced LSCS in 11, 7 and 4 and deceleration in CTG in 5, 8 and 1 patient in group I, II and III respectively. Indications of LSCS was thick MSL in 2, 1 and 1, NPOL in 4, 3 and 2 and previous LSCS in 5, 3 and 1 respectively. Reason for termination was decreased AFI in 23, 14 and 6and spontaneous labour in 7, 16 and 24 patients in group I, II and III respectively. The difference was significant (P< 0.05). NICU admission was seen in 21, 4 and 3. Reason for NICU admission was tachypnea in 9, 1 and 1, LBW in 7, 1 and 1 and RD in 5, 2 and 1. Neonatal outcome was uneventful in 28, 30 and 30 and death seen in 2, 0 and 0 in group I, II and III respectively. The difference was significant (P< 0.05).**Conclusion:** A major factor in determining unfavorable outcomes for mothers and fetuses is AFI. AFI <5 is linked to poor fetal and maternal outcomes, including as low birth weight, meconium-stained fluid, low APGAR score, and increased NICU admission, as well as greater rates of surgical deliveries. Fetal observation in conjunction with intensive intrapartum care may help reduce unfavorable perinatal outcomes.

Keywords: Amniotic fluid index, Tachypnea, Perinatal

INTRODUCTION

The Amniotic fluid index (AFI) is a measurement used during pregnancy to assess the amount of amniotic fluid surrounding the baby in the uterus. Adequate amniotic fluid is essential for the baby's development and overall health.[1] The AFI is commonly measured during a prenatal ultrasound and can help identify potential complications. An essential feature of antepartum examination is amniotic fluid assessment, particularly in the third trimester of pregnancy.[2]

Between 700 and 800 cc of amniotic fluid are typically present throughout the third trimester.[3,4] "Abnormally low level of amniotic fluid volume for the gestational age" is the definition of oligohydramnios, a reduced amount of amniotic fluid. It has been claimed that 3-5% of pregnancies are complicated with oligohydramnios.[5] The "amniotic fluid index" is used to assess oligohydramnios and determine whether there is enough amniotic fluid present. The AFI is determined through an ultrasound and involves dividing the uterus into four quadrants. In each quadrant, the deepest pocket of amniotic fluid is measured.[6] It can evaluate the amniotic fluid levels objectively (e.g., amniotic fluid index ≤5 cm, single deepest pocket <2 cm) or qualitatively (e.g., reduced amniotic fluid volume). The measurements from these four quadrants are then summed to give the total AFI. These consist of two diameter pockets, one depth pocket, and four quadrant pockets.[7,8]

AIM AND OBJECTIVES

The present study was conducted to assess low amniotic fluid index and its effect on perinatal outcome.

MATERIALS & METHODS

The present prospectivestudy was conducted to evaluateperinatal outcomes in 90singleton pregnant femaleswith low Amniotic Fluid Index **(**AFI) presenting with term pregnancy (37 to 40 weeks)attending the OPD/Emergency, Department of Obstetrics and Gynecology, Government Medical College and Hospital, Purnea, Bihar, India. All were informed regarding the study and their written consent was obtained.The period of study was from July 2023 to March 2024.

Inclusion Criteria

- Pregnant femaleswho give written informed consent
- All singletonpregnant femaleswith low Amniotic Fluid Index**(**AFI)presenting with term pregnancy (37 to 40 weeks)
- Available for follow up.

Exclusion Criteria

- Pregnant femaleswho not give written informed consent
- Pregnancy with assisted reproductive technologies, rupture membrane, antepartum haemorrhage (APH), adherent placenta, patients whose gestational age is unknown or not confirmed, premature delivery, abnormal placenta, and abnormal cord, cases like intrauterine death, multiple pregnancies, Rh iso-immunization, gestational diabetes, chronic hypertension or preeclampsia,congenital anomalies in newborns, mothers with chronic illnesses, and those on long-term medications, withdraw from the study
- Those unable to attend follow-up.

Data such as name, age, etc. was recorded. All were subjected to detailed clinical examination. All the females were subjected to an ultrasound examination to monitor fetal wellbeing. Amniotic fluid index was assessed using Phelan's technique.

Based upon AFI, all the patients were divided into three groups –

- Group I with AFI<5 cm,
- Group II with AFI≥5-8 cm and
- Group III with AFI>8 cm.

All pregnant women received routine prenatal care, including standard ultrasounds to assess pregnancy status and AFI. Patients were then followed up with until birth. Subsequently, an analysis and comparison were conducted between the three groups' perinatal outcomes.Maternal outcome and neonatal outcome were recorded.

Statistical Analysis

Data thus obtained were subjected to statistical analysis by using the Statistical Package for the Social Sciences (SPSS), version 22 (IBM, USA). The Mann-Whitney U-test was used to assess differences between continuous variables, and the Pearson Chi-square and Fisher's exact tests were used to test differences in categorical variables. The differences between the means of the groups were examined using a one-way ANOVA test. P less than 0.05 was deemed significant.

RESULTS

Table I: Assessment of theBaseline variables

Parameters	Variables	Group I	Group II	Group III	P value
Parity	Primipara	15	18	19	0.94
	Multipara	15	12	11	

Gestational age (weeks)	37-38	13	16	17	0.83
	39-40	17	14	13	
Reason for admission	Decreased AFI	76	72	4	0.05
	Safe confinement	12	11	5	
	Spontaneous onset of labour	2	7	81	

Table I and figure 1, shows that in group I, group II and group III, Paritywas primiparain 15, 18 and 19 and multipara in 15, 12 and 11 patients respectively. Gestational age (weeks) found to be 37-38 in 13, 16 and 17 and 39-40 in 17, 14 and 13 patients respectively. Reason for admission was decreased AFI in 76, 72 and 4, safe confinement in 12, 11 and 5 and spontaneous onset of labour in 2, 7 and 81 patients respectively.

Figure 1: Assessment of baseline variables

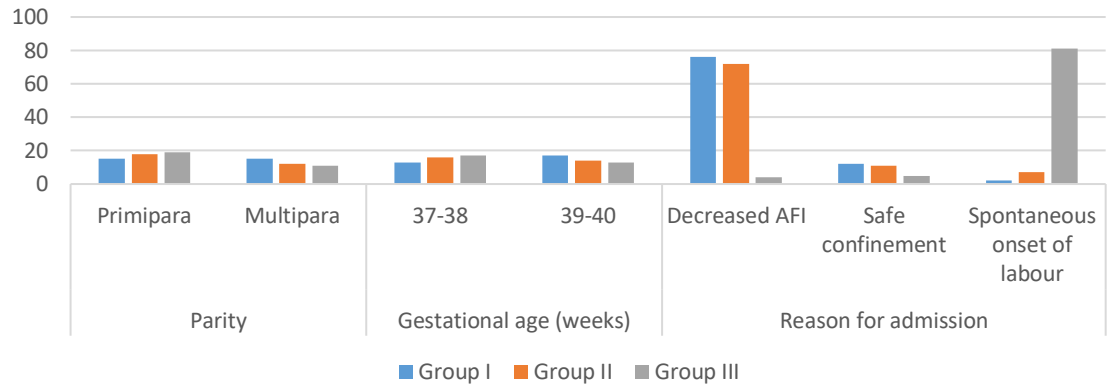


Table II:Assessment of maternal (singleton pregnancy)outcomewith low Amniotic Fluid Index

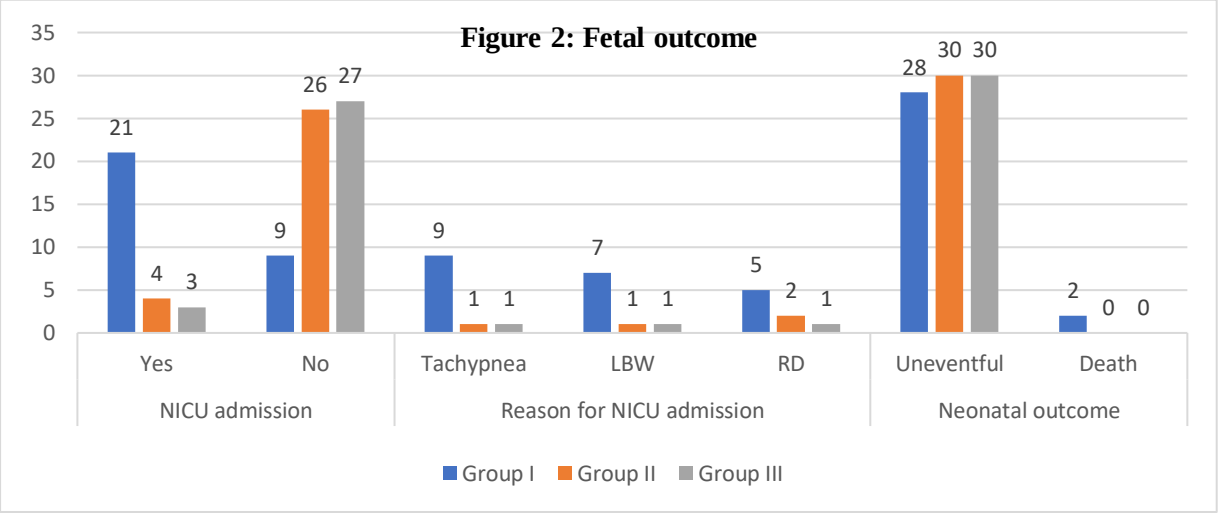
Parameters	Variables	Group I	Group II	Group III	P value
Mode of delivery	FTVD	14	15	24	0.02
	Spontaneous induced LSCS	11	7	4	
	Deceleration in CTG	5	8	1	
Indications of LSCS	Thick MSL	2	1	1	0.78
	NPOL	4	3	2	
	Previous LSCS	5	3	1	
Reason for termination	Decreased AFI	23	14	6	0.05
	Spontaneous labour	7	16	24	

Table II shows that mode of delivery was FTVD in 14, 15 and 24, spontaneous induced LSCS in 11, 7 and 4 and deceleration in CTG in 5, 8 and 1 patient in group I, II and III respectively. Indications of LSCS was thick MSL in 2, 1 and 1, NPOL in 4, 3 and 2 and previous LSCS in 5, 3 and 1 respectively. Reason for termination was decreased AFI in 23, 14 and 6and spontaneous labour in 7, 16 and 24 patients in group I, II and III respectively. The difference was significant (P< 0.05).

Table III: Assessment of the Fetal outcome

Parameters	Variables	Group I	Group II	Group III	P value
NICU admission	Yes	21	4	3	0.01
	No	9	26	27	
Reason for NICU admission	Tachypnea	9	1	1	0.04
	LBW	7	1	1	
	RD	5	2	1	
Neonatal outcome	Uneventful	28	30	30	0.61
	Death	2	0	0	

Table III, figure 2, shows that NICU admission was seen in 21, 4 and 3. Reason for NICU admission was tachypnea in 9, 1 and 1, LBW in 7, 1 and 1 and RD in 5, 2 and 1. Neonatal outcome was uneventful in 28, 30 and 30 and death seen in 2, 0 and 0 in group I, II and III respectively. The difference was significant (P< 0.05).



DISCUSSION

Amniotic fluid act as protective fluid which provides cushion like effect on fetus as well as provide the space for physical growth and musculoskeletal growth of the growing fetus, promote development of fetal lung, and also helps in aversion of umbilical cord compression.[9] We found that in group I, group II and group III, Parity was primipara in 15, 18 and 19 and multipara in 15, 12 and 11 patients respectively. Gestational age (weeks) found to be 37-38 in 13, 16 and 17 and 39-40 in 17, 14 and 13 patients respectively. Reason for admission was decreased AFI in 76, 72 and 4, safe confinement in 12, 11 and 5 and spontaneous onset of labour in 2, 7 and 81 patients respectively. Kumari et al.[10] conducted a study on a total of 100 antenatal females. AFI was <5 in 38%. Low AFI was associated with LSCS and negative fern test was statistically significant (p<0.05). They observed a significant association of low AFI with low birth weight, poor APGAR score at 1 as well as 5 minutes and higher risk of NICU admission (p<0.05). The area under the curve and sensitivity as well as specificity at cutoff (4.5) was maximum for NICU admission followed by LSCS (p<0.05).

We found that mode of deliverywas FTVD in 14, 15 and 24, spontaneous induced LSCS in 11, 7 and 4 and deceleration in CTG in 5, 8 and 1 patient in group I, II and III respectively. Indications of LSCS was thick MSL in 2, 1 and 1, NPOL in 4, 3 and 2 and previous LSCS in 5, 3 and 1 respectively. Reason for termination was decreased AFI in 23, 14 and 6and spontaneous labour in 7, 16 and 24 patients in group I, II and III respectively. Rosati et al.[11] compared perinatal outcome in induced post-term pregnancies with normal amniotic volume and in patients with prolonged pregnancy undergone induction for oligohydramnios, evaluated by two different ultrasonographic methods. Amniotic fluid volume was measured, using Single Deepest Vertical Pocket (SDVP) and Amniotic Fluid Index (AFI), in 961 singleton uncomplicated prolonged pregnancies. In 109 of these patients, hospitalization was planned for induction of labor, during or after 42 weeks of gestation, for oligohydramnios, post-term pregnancy and other indications in 47, 51 and 11 cases, respectively. Perinatal outcome included: rate of caesarean section, fetal distress, non-reassuring fetal heart tracing, presence of meconium, umbilical artery pH < 7.1, Apgar score at 5 minutes < 7, admission to neonatal intensive care unit (NICU). Oligohydramnios was diagnosed in 4.89% of cases, when at least one of the two methods was used. A reduced AFI and SDVP value identified 4.47% and 3.75% of cases, respectively, even if without statistical difference. No statistical differences were reported in perinatal outcomes in post-term *versus* prolonged pregnancies with oligohydramnios, also in relation to the two different ultrasonographic methods.

We found that NICU admission was seen in 21, 4 and 3. Reason for NICU admission was tachypnea in 9, 1 and 1, LBW in 7, 1 and 1 and RD in 5, 2 and 1. Neonatal outcome was uneventful in 28, 30 and 30 and death seen in 2, 0 and 0 in group I, II and III respectively. Locatelli A et al.[12] in their study perinatal outcome was compared between cases with AFI ≤5 cm and those with AFI >5 cm. Three thousand and forty-nine women met the inclusion criteria, 341 of which (11%) had an AFI ≤5 cm. Gestational age at delivery, rates of nulliparity and induction of labor were significantly different between cases with oligohydramnios and those with normal AFI (all p<0.001). Rates of cesarean delivery for non-reassuring fetal testing (8.2% vs. 3.9%, p<0.001) and of neonates with birth weight <10th percentile (13.2% vs. 5.5%, p<0.001) were significantly higher in the AFI ≤5 cm group compared with the AFI >5 cm. No significant differences were identified between the two groups in rates of meconium-stained amniotic fluid, 5-min Apgar score <7, or umbilical artery pH <7. Logistic regression analysis demonstrated that the association between oligohydramnios and rate of cesarean delivery for non-reassuring fetal testing lost significance after controlling for gestational age at delivery, nulliparity and induction of labor, whereas the association between AFI ≤5 cm and low birth weight centiles remained statistically significant.

LIMITATIONS OF THE STUDY

The shortcoming of the study is small sample size and short duration of the study.It was not possible to compare the outcomes because there have been fewer studies on borderline oligohydramnios and perinatal outcomes.

CONCLUSION

The authors found that a major factor in determining unfavourable outcomes for mothers and fetuses is AFI. AFI <5 is linked to poor fetal and maternal outcomes, including low birth weight, meconium-stained fluid, a low APGAR score, and increased NICU admission, as well as greater rates of surgical deliveries. Fetal observation in conjunction with intensive intrapartum care may help reduce unfavourable perinatal outcomes.

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