Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

# Perinatal Outcome and Doppler Velocimetry Abnormalities in Low-risk Term Patients with Borderline Oligohydramnios

**Charu Bhatia[1], K B Suma[2], Aditya Batra[3], Vikram Patil[4]**

[1]Senior Resident, Department of Obstetrics and Gynaecology, Maharaja Agrasen Medical College, Agroha, Haryana, India, [2]Professor and Head of the Department of Obstetrics and Gynaecology, JSS Medical College and Hospital, JSSAHER, Mysuru, Karnataka, India, [3]Senior Resident, Department of Paediatrics, Government Medical College, Chandigarh, India, [4]Associate Professor, Department of Radio-diagnosis, JSS Medical College and Hospital, JSSAHER, Mysuru, Karnataka, India

## Abstract

**Background:** Amniotic fluid is an indicator of normal placental function. Doppler study of umbilical artery is an independent predictor of perinatal outcomes. Combining these two can give better overview of management and prognostication in borderline amniotic fluid index (AFI) defined as AFI 5–8 cm.

**Objective:** The objective was to study the perinatal outcome and Doppler velocimetry abnormalities in term low-risk pregnancies with borderline "AFI".

**Methods:** After taking written informed consent, 115 eligible candidates underwent USG with AFI and umbilical artery Doppler and velocimetry changes and perinatal outcome was analyzed.

**Results:** Out of the 115 subjects selected, 100 underwent cesarean section, 12 delivered vaginally and 3 underwent instrumental delivery. 28 cesarean sections and 2 outlet forceps delivery were for fetal distress, respectively. Umbilical artery Doppler abnormality was seen in 5 cases and non-reassuring non-stress test in 11 cases. Thick meconium staining was noted in 25 cases. 19 babies were admitted in neonatal intensive care unit for varying period. 31 babies were LBW of which 3 were fetal growth restriction. Respiratory distress was noted in 16 babies; however, 5' APGAR was >7 in all cases and there was no perinatal mortality.

**Conclusion:** Cesarean section rates were high in subjects with borderline AFI, especially AFI 5-6 cm. It was also found to be associated with adverse perinatal outcomes and abnormal.

**Key words:** Amniotic fluid index, Borderline oligohydramnios, Doppler

## INTRODUCTION

Developing fetus is surrounded by amniotic fluid which serves to provide several benefits to the fetus. The dynamics of amniotic fluid formation and absorption are complex. There is still unclear understanding about its regulation. Moreover, the etiopathogenesis, management options, and prognosis widely differ across the range of AFI. Amniotic fluid volume indicates fetal status and placental function. Hence, oligohydramnios indicate chronic fetal hypoxia. Amniotic fluid index as measured by Phelan *et al.*'s[1] four quadrant methods has been found to be the most acceptable indicator of amniotic fluid volume. Various ranges have been described for normal AFI. Khalidkar *et al.*[2] found that the median peaked at 27th week of gestation (added as suggested by reviewers). Borderline oligohydramnios is described as an AFI of 5–8 cm. It has been found to be associated with a variety of adverse pregnancy and perinatal outcomes. Doppler velocimetry has been an independent predictor of fetal hypoxic state and when used in adjunction with borderline AFI, it has been seen to increase the incidence of adverse perinatal outcome fivefold. However, some studies have questioned the existence of term oligohydramnios in the absence of other risk factors primarily pre-eclampsia. We therefore by our study aim is to study perinatal outcome and Doppler

Access this article online

www.ijss-sn.com

Month of Submission : 08-2023
Month of Peer Review : 08-2023
Month of Acceptance : 09-2023
Month of Publishing : 10-2023

**Corresponding Author:** Charu Bhatia, C/O Mahesh Batra, HP Acme Fuels Bhuna Road, Fatehabad - 125 050, Haryana, India.

velocimetry abnormalities in term low-risk pregnancies with borderline amniotic fluid index.

## METHODOLOGY

This was a hospital-based prospective study. A total of 115 term low-risk pregnant women from November 2017 to July 2018 were included in the study carried out at JSS Medical College and Hospital, Mysuru Karnataka in the Department of Obstetrics and Gynaecology. For the purpose of this study, borderline oligohydramnios was defined as an AFI of 5–8 cm measured by transabdominal ultrasonography using 4 quadrant technique. The study was passed by the ethical committee of the university. Written informed consent was taken and baseline demography, past obstetrics, and medical history were recorded in a data sheet for each of the patient included in the study. On admission, fetal surveillance was done by non-stress test (NST) and ultrasonography with biophysical profile including fetal biometry and umbilical artery Doppler. Gestational age at the time of delivery was recorded. Liquor was assessed (volume, color, etc.) at the time of artificial rupture of the membranes, during labor, and at the time of lower segment cesarean section (LSCS). Women who had 4 or more visits at our hospital were considered as booked cases. For all the selected cases, a thorough history was taken, and complete examination was done. Clinical evidence of oligohydramnios was looked for. The previous obstetric records and ultrasound reports were reviewed. Only the good and excellent dates and excellent date's women with thirty-seven completed weeks of gestation were studied. For all women baseline investigations such as Hb%, blood group, and Rh typing, urine examination was done. Women with term singleton low-risk pregnancies (37–40 weeks), borderline AFI, intact amniotic membrane, and vertex presentation were included in the study. Women with any maternal systemic illness, vaginal bleeding, prematurely ruptured membranes, multiple gestation, malpresentation, and post-dated pregnancy beyond 40 completed weeks were excluded. The pregnancies were further classified as early (37–38 + 6 weeks) and late term (39–40 weeks). The pregnancies with fetal malformations were also excluded from the study except for the deformities that can be caused by oligohydramnios like congenital talipes equino varus (CTEV). The cases in which amnioinfusion was done were also excluded from the study to avoid confounding outcomes. Labor was monitored with the help of continuous electronic fetal monitoring and cardiotocography. Those who developed significant variable decelerations and repetitive late decelerations or other ominous FHR pattern with or without meconium-stained liquor which persisted despite corrective measures such as change in maternal position, hydration, $O_2$ inhalation, and stopping oxytocin were delivered by LSCS or forceps delivery. All newborns were attended by neonatologists. The babies admitted to neonatal intensive care unit (NICU) were routinely evaluated for renal function.

Various outcome measures recorded were

1. Doppler velocimetry abnormalities
2. Non-reactive NST
3. Occurrence of thick meconium-stained liquor
4. LSCS indicated for fetal distress
5. APGAR score <7 at 5 min
6. Birth weight ≤ 2.5 kg
7. Respiratory distress syndrome (presence of at least 2 of the following 3 features:
   (i) Tachypnea (RR>60/min)
   (ii) Grunting
   (iii) Chest retractions
8. NICU admission
9. Perinatal death (from 37 weeks till 7 days of life).

The data results were calculated in the form of percentage and *P* value was deduced. For the purpose of study, $P < 0.05$ was considered as statistically significant. All relevant information recorded was appropriately analyzed by SPSS version 21.0.

## RESULTS

A total of 115 eligible women were enrolled in this study. Most of the subjects fell in the age group of 21-30 years with the mean age being 25 years. 74 out of the total 115 patients were primigravida. Mean gestational age at delivery was 37 weeks and 6 days. 71 were early term and 44 were late term. Mean "AFI" was 6.31 with mean AFI in late-term mothers being 5.95 and that in early-term mothers being 6.44 which was found to be nearly similar. All of them were subjected to umbilical artery Doppler and it was noticed that only 5 had Doppler abnormalities out of which 2 had brain sparing and three had increased pulsatility index. It was also noted that 4 out of the five abnormal Doppler studies belonged to lower range of AFI that is 5–6 cm. The amniotic fluid was found to be thick meconium stained in 25 (21.7%) and thinly meconium stained in 4 (2.6%) women which was statistically significant ($P$=0.017). A total of 31 women (26.9%) developed fetal distress. 29 (93.5%) of them underwent cesarean section and 2 (6.5%) of them delivered by outlet forceps delivery which was statistically significant showing increasing trend toward cesarean section. Cesarean section rates were high in the non-reactive NST group (72.8%). However, even when the NST at admission was reactive, 19.2% cases had LSCS done due to subsequent fetal distress [Table 1]. The mean Apgar score was 7.8

**Table 1: Perinatal outcome in borderline AFI**

| Parameter | Number | Percentage | *P* value |
|---|---|---|---|
| Umbilical artery Doppler abnormality | 5 | 4.3 | 0.069 |
| Non-reactive NST | 11 | 9.6 | 0.959 |
| Thick MSL | 25 | 19.1 | 0.017 |
| LSCS for fetal distress | 29 | 93.5 | 0.035 |
| Outlet forceps delivery | 2 | 6.5 | |
| Apgar<7 at 5 min | 0 | 0 | 0 |
| Respiratory distress at birth | 16 | 14 | 0.881 |
| BW<2.5 kg | 31 | 27 | 0.075 |
| NICU admission | 19 | 16 | 0.035 |
| Perinatal death | 0 | 0 | 0 |

AFI: Amniotic fluid index, NST: Non-stress test, NICU: Neonatal intensive care unit, LSCS: Lower segment cesarean section, BW: Birth weight

**Table 2: Perinatal outcome distribution by AFI**

| AFI | >5<6 cm | >6<7 cm | >7<8 cm | 8 cm |
|---|---|---|---|---|
| Abnormal umbilical artery Doppler | 4 | 0 | 1 | 0 |
| Non-reactive NST | 2 | 5 | 4 | 0 |
| Thick meconium-stained liquor | 17 | 5 | 3 | 0 |
| LSCS for fetal distress | 13 | 8 | 7 | 1 |
| Respiratory distress at birth | 6 | 5 | 3 | 2 |
| LBW | 15 | 9 | 6 | 1 |
| NICU admission | 14 | 4 | 1 | 0 |

AFI: Amniotic fluid index, NST: Non-stress test, NICU: Neonatal intensive care unit, LSCS: Lower segment cesarean section, LBW: Low birth weight

and 8.9 at 1 min and 5 min, respectively. None of the newborns had a 5 min Apgar score of less than 7. "Low birth weight defined as BW ≤ 2.5 KG" was noted in 31 newborns (27%) of which 2 were <3 SD (fetal growth restriction [FGR]) which was not significant statistically. Five of these babies had ultrasound Doppler velocimetry abnormalities out of which 2 had severe FGR in the form of brain sparing. 19 (16%) neonates required admission to NICU for various indications such as birth asphyxia, respiratory distress syndrome, and meconium aspiration. 6 (5%) required admission for more than 1 week out of which one had severe respiratory asphyxia. This was not statistically significant. There were no perinatal deaths in our study.

## DISCUSSION

The results of various perinatal outcomes were found in sync with the results of similar studies done previously. In the present study, 59 out of 115 women were in the age group 20–25 years (51.3%). 35.7% women were multigravida. Cosey *et al.*[6], Magann *et al.*[7], and Chauhan[8] also concluded that age and parity are not significantly related to oligohydramnios. The mean gestational age at delivery was 37 weeks and 6 days. Jamal *et al.* 2016 also found similar results.

- We found no correlation between non-reactive NST and oligohydramnios which was consistent with findings of Petrozella *et al.*[9] However, it was an indication for cesarean section in many cases ($n$ = 13)

We did not find any significant relationship between umbilical artery Doppler and borderline oligohydramnios. However, we did notice that 4 out of the 5 Doppler abnormalities were seen in AFI 5-6 cm group [Table 2]. Kwon *et al.*[4] 2006 found that the incidence of adverse perinatal outcome was three times increased in the borderline AFI group and five times when combined with abnormal umbilical artery Doppler.

The presence of thick meconium-stained liquor was observed in 19.1% cases which is like studies of Jamal *et al.*[5] (17.2%). Gumus *et al.*[10] also reported higher rates of meconium staining in their study. Cesarean section indicated for fetal distress was done in 24.4 % cases. Cesarean section rates were found to be more in those with "borderline oligohydramnios" and non-reactive NST (72.8%). However, even when NST was reactive, 19.2% developed fetal distress and underwent cesarean section.

Sarno *et al.*[11] in their study observed that "rate of fetal distress and low Apgar score was higher in women with AFI 5 cm". Asgharnia *et al.*[3] found 5-min Apgar <7 in 20.2% newborns. We did not note any 5-min Apgar score of <7. However, 27% of newborns in our study were low birth weight which was consistent with studies of Jamal *et al.*[4]. Petrozella *et al.*,[9] and Asgharnia *et al.*[3] noted much higher rates on the contrary. Sixteen percent of neonates required admission to NICU for various indications such as respiratory distress, birth asphyxia, and meconium aspiration which was again in line with studies of Asgharnia *et al.*[3] Magann *et al.*[7] noticed much lower rates in their study. Bilateral CTEV was diagnosed in one. This could be due to compression. We observed respiratory distress in 13. 7% of newborns at birth whereas 3.4% was noted by Casey *et al.*[6] There were no perinatal deaths in our study.

## CONCLUSION

An amniotic fluid index of 5–8 cm leads to various adverse outcomes. However, the trend was more toward lower values of AFI, i.e., 5–6 and 6–7 cm range whereas cases with AFI 7–8 had an outcome profile in line with normal AFI values. Even though clear association cannot be established, cases with AFI in the borderline range need to be watched more closely for signs of fetal compromise. Moreover, such pregnancies should be monitored in hospitals which have a good neonatal care unit. Based on increased incidence of adverse perinatal outcome and increasing trend toward cesarean section, we recommend more studies to arrive at a consensus on fetal testing,

timely intervention and intrapartum fetal monitoring and management in cases of borderline oligohydramnios. We also recommend considering AFI of 7 and above in line with normal AFI and decision of cesarean section in such cases be based on other factors and not reduced liquor alone.

## REFERENCES


1. Phelan JP, Smith CV, Broussard P, Small M. Amniotic fluid volume assessment with the four-quadrant technique at 36-42 weeks' gestation. J Reprod Med 1987;32:540-2.
2. Khadilkar SS, Desai SS, Tayade SM, Purandare CN. Amniotic fluid index in normal pregnancy: An assessment of gestation specific reference values among Indian women. J Obstet Gynaecol Res 2003;29:136-41.
3. Asgharnia M, Faraji R, Salamat F, Ashrafkhani B, Dalil Heirati SF, Naimian S. Perinatal outcomes of pregnancies with borderline versus normal amniotic fluid index. Iran J Reprod Med 2013;11:705-10.
4. Kwon JY, Kwon HS, Kim YH, Park YW. Abnormal Doppler velocimetry is related to adverse perinatal outcome for borderline amniotic fluid index during third trimester. J Obstet Gynaecol Res 2006;32:545-9.
5. Jamal A, Kazemi M, Marsoosi V, Eslamian L. Adverse perinatal outcomes in borderline amniotic fluid index. Int J Reprod Biomed 2016;14:705-8.
6. Casey BM, McIntire DD, Bloom SL, Lucas MJ, Santos R, Twickler DM, *et al.* Pregnancy outcomes after antepartum diagnosis of oligohydramnios at or beyond 34 weeks' gestation. Am J Obstet Gynecol 2000;182:909-12.
7. Magann EF, Chauhan SP, Hitt WC, Dubil EA, Morrison JC. Borderline or marginal amniotic fluid index and peripartum outcomes: A review of the literature. J Ultrasound Med 2011;30:523-8.
8. Chauhan SP, Sanderson M, Hendrix NW, Magann EF, Devoe LD. Perinatal outcome and amniotic fluid index in the antepartum and intrapartum periods: A meta-analysis. Am J Obstet Gynecol 1999;181:1473-8.
9. Petrozella LN, Dashe JS, McIntire DD, Leveno KJ. Clinical significance of borderline amniotic fluid index and oligohydramnios in preterm pregnancy. Obstet Gynecol 2011;117:338-42.
10. Gumus II, Koktener A, Turhan NO. Perinatal outcomes of pregnancies with borderline amniotic fluid index. Arch Gynecol Obstet 2007;276:17-9.
11. Sarno AP Jr., Ahn MO, Phelan JP. Intrapartum amniotic fluid volume at term. Association of ruptured membranes, oligohydramnios and increased fetal risk. J Reprod Med 1990;35:719-23.


**How to cite this article:** Bhatia C, Suma KB, Batra A, Patil V. Perinatal Outcome and Doppler Velocimetry Abnormalities in Low-risk Term Patients with Borderline Oligohydramnios. Int J Sci Stud 2023;11(7):41-44.

**Source of Support:** Nil, **Conflicts of Interest:** None declared.