International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Bhangale S et al. Int J Reprod Contracept Obstet Gynecol. 2022 Jun;11(6):1734-1739
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20221449

Original Research Article

Obstetric outcome of pregnancies with borderline versus normal amniotic fluid index at term: an analytical cross sectional study

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Received: 14 April 2022
Accepted: 04 May 2022

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ABSTRACT

Background: Amniotic fluid plays a vital role in the normal growth of fetus and promotes normal musculoskeletal development. Amniotic fluid index (AFI) is preferred method of amniotic fluid measurement in pregnancy which is done by ultrasonography. The normal range of AFI is between 5-24 cm. Any value above 24 cm is considered hydramnios and below 5 cm as oligohydramnios. More accepted range for borderline amniotic fluid index is 5-8 cm. The objective of this analytical cross-sectional, study was carried out to characterize maternal and fetal risks associated with borderline AFI in pregnancies, compared with normal amniotic fluid index.
Methods: This study included 180 women fulfilling inclusion criteria. 90 women were in borderline AFI group and 90 women in normal AFI group. Both were compared based on maternal outcome such as mode of delivery- normal vaginal delivery, instrumental, LSCS. Indication of instrumental, caesarean section and associated maternal morbidity, perinatal morbidity and mortality was compared.
Results: Out of 90 women, 41 women delivered vaginally (45.55%), 30 by instrumental (33.33%) and 19 by LSCS (21.11%). 26 NICU admission in borderline AFI group 13 were due to neonatal jaundice, 5 were due to respiratory distress, 3 due to sepsis, 2 due to seizures, 1 had necrotizing enterocolitis, 1 was due to persistent tachypnea, 1 due to severe hypoglycemia. In borderline AFI group 3.3% perinatal mortality was reported.
Conclusions: Maternal morbidity, perinatal morbidity and mortality was higher in borderline AFI group as compared to normal AFI group. There is a significant association of amniotic fluid volume with the maternal morbidity, perinatal morbidity and perinatal mortality.

Keywords: Borderline amniotic fluid index, Maternal outcome, Perinatal outcome, Operative delivery

INTRODUCTION

Amniotic fluid plays a vital role in the normal growth of fetus and promotes normal musculoskeletal development. It permits fetal swallowing- essential for gastrointestinal tract development and fetal breathing necessary for lung development.

Amniotic fluid guards against umbilical cord compression and protects the fetus from trauma. It even has bacteriostatic properties. Amniotic fluid assessment is an essential part of antenatal fetal assessment. Normal value of amniotic fluid varies with gestational age.

Amniotic fluid volume abnormalities may reflect a problem with fluid production or its circulation such as underlying fetal or placental pathology. These volume extremes may be associated with increased risks for adverse pregnancy outcome.[1]

Gumus and colleagues reported higher incidence of preterm delivery, fetal distress and birth weight less than 10th percentile in borderline AFI. Some authors have not confirmed the association of adverse perinatal outcome with oligohydramnios.[2-8] Decreased amount of amniotic fluid, particularly in third trimester has been associated with multiple fetal risks like cord compression,

musculoskeletal abnormalities such as facial distortion and clubfoot, intrauterine growth restriction, low birth weight, fetal distress in labour, meconium aspiration syndrome, severe birth asphyxia, low APGAR scores, NICU admission, congenital abnormalities and stillbirths.[2] Also the low amniotic fluid index may increase the operative delivery rate.[10,12]

Based on variation in adverse pregnancy outcomes associated with borderline amniotic fluid it seems that there is a need to clarify the issue. Thus this study was conducted to compare maternal and perinatal outcome of pregnancies with borderline versus normal amniotic fluid index at term.

METHODS

This analytical cross-sectional study was conducted in department of obstetrics and gynaecology at Lata Mangeshkar Hospital, Hingna, Nagpur after institutional ethics committee approval. This study was conducted from December 2018 to December 2020.

Inclusion criteria

Pregnant women with following criteria were included (a) borderline aminotic fluid index at term; and (b) normal aminotic fluid index at term.

Exclusion criteria

Patients with following criteria were excluded: (a) pregnancy with premature rupture of the membranes; (b) with anomalous uterus; (c) multiple gestation; (c) intrauterine death of fetus; (d) previous history of caesarean section, hysterotomy and myomectomy; and (e) appropriate subject withdrawal criteria: women not willing to participate at any stage.

Pregnant women attending the outpatient department (OPD) for antenatal follow up and fulfilling inclusion criteria were advised for ultrasonography to know amniotic fluid index at 37 weeks and beyond were included in study. Pregnant women with Amniotic fluid index 8-24 cm were included in first group (A) and women with Amniotic fluid index 5-8 cm were included in second group (B).

At the time of admission for delivery, physical examination and relevant investigations was checked and documented in a case record form. Total 180 women were studied. 90 women with normal amniotic fluid index and 90 women with borderline amniotic fluid index were compared in our study. The parameters which were studied, were- any associated complication during anenatal-PIH, DM, Placenta previa etc, Mode of delivery like normal vaginal, instrumental and caesarean delivery. Indication for instrumental and caesarean section were noted. Any immediate post natal complications were noted.

Neonatal outcome in the form of Apgar score, birth weight, necessity of NICU admission, PICU admission were recorded. Indication of NICU/PICU admission with neonatal morbidity and mortality if any were noted in both the groups. All the data was entered in the excel sheet and data was verified by another person with the help of MS excel input validation tool. The statistical analysis was done using Epi info software version 7. Mean and standard deviation, percentage was used for quantitative data. The paired T test and Mann Whitney U Test were used. Level of significance was alpha equal to or <0.05.

RESULTS

This study is performed in 180 women. 90 women with normal AFI (group A) compared with 90 women with borderline AFI at term (group B).

In this study 92.2% in age group 26-30 years, 46.7% in age group 31-35 years 35% in 18-25 years were reported.

In borderline AFI group 85.6% women were primigravida where as 14.4% were multigravida.

In group B, 41 women delivered vaginally, 30 by instrumental and 19 by LSCS.

In group B, indication of LSCS was 68.42% fetal distress followed by 15.78% due to abnormal CTG, 5.2% placenta previa and 10% abruption placenta.

Selected outcomes showed significant difference in both the groups. In presence of oligohydramnios, the occurrence of abnormal CTG, development of fetal distress, the rate of LSCS, low 5 minute Apgar score, low birth weight, perinatal morbidity and mortality are more.

In Figure 1, 92.2% in age group 26-30 years, 46.7% in age group 31-35 years, 35% in age group 18-25 years, 13.3% in age group 35-40 and none in 40-45 years in the both the groups.

In Figure 2, normal AFI 47 women delivered vaginally, 29 delivered by instrumental delivery and 14 delivered by LSCS. In borderline AFI 41 women delivered vaginally, 30 delivered by instrumental delivery and 19 delivered by LSCS.

In Figure 3, normal AFI 42.85% LSCS were due to fetal distress followed by 28.57% due to abnormal CTG, 21.42% placenta previa and 7.14% apruption placenta. In borderline AFI indication of lscs 68.42% fetal distress followed by 15.78% due to abnormal CTG ,5.2% placenta previa and 10% abruption placenta. The p value was 0.03 which is significant and shows that there is correlation between borderline AFI and LSCS.

In Figure 4 this show 22 women had forcep delivery and 7 had ventouse delivery in normal AFI group. 24 women had

forcep delivery and 6 had ventouse delivery in borderline AFI group.

Figure 5 shows 20 women had instrumental delivery due to maternal exhausation, 6 in view of fetal distress, 3 due to inadequate maternal expulsive forces and 1 for prolonged 2nd stage in borderline AFI group. Whereas in normal AFI group 16 women had instrumental delivery due to maternal exhausation, 8 in view of inadequate maternal expulsive forces, 3 due to fetal distress and 2 for prolonged 2nd stage.

In Figure 6, 35.6% babies had Apgar score less than 7 at 1 minute and 64.4% Apgar score more than 7 at 1 min in normal AFI. 44.4% babies had Apgar score less than 7 at 1 minute and 55.6% Apgar score more than 7 at 1 min in borderline AFI.

Figure 7 shows the number of NICU admission in both the groups. Borderline AFI shows 28.8% which is more than normal AFI group.

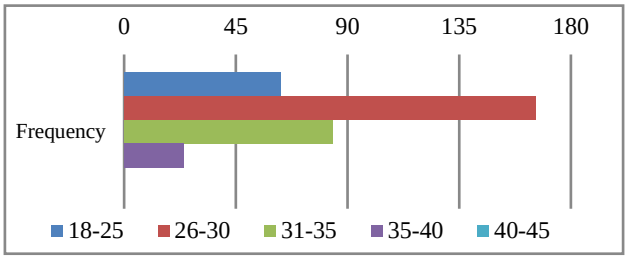

Figure 1: Age distribution among the women in the study group.

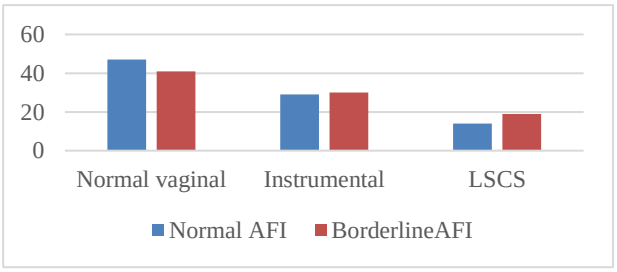

Figure 2: Mode of delivery in normal AFI and borderline AFI group.

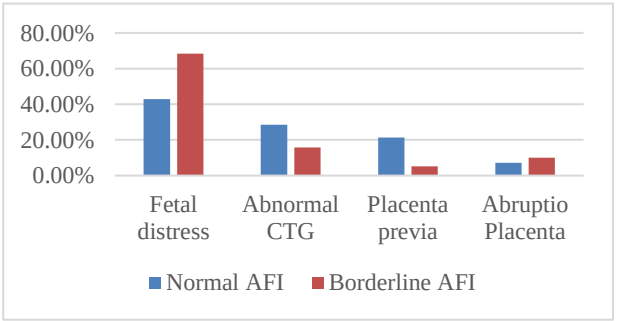

Figure 3: Indications of LSCS in both normal AFI and borderline AFI.

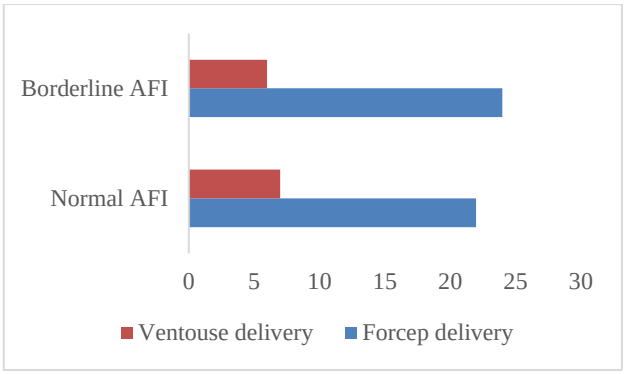

Figure 4: Number of instrumental delivery in both the groups.

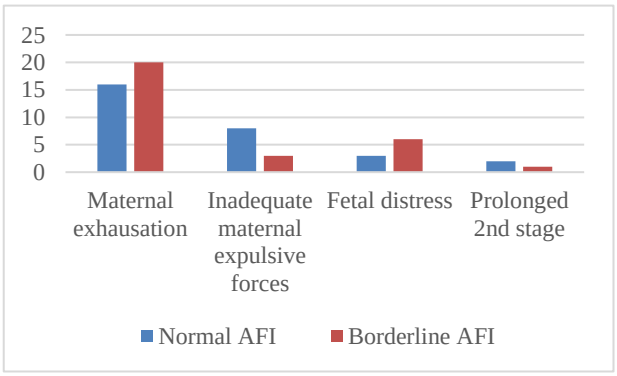

Figure 5: Indications of instrumental delivery.

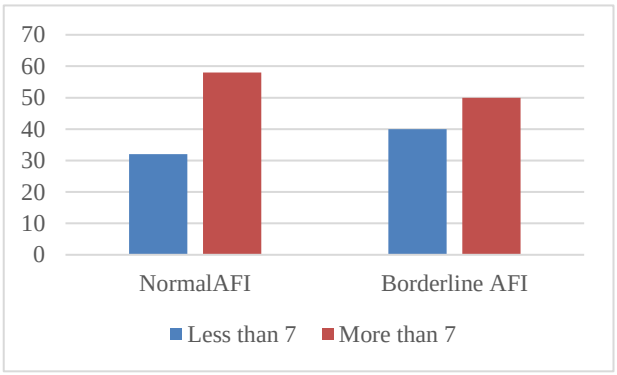

Figure 6: Apgar score in baby of normal AFI and borderline AFI at 1 min.

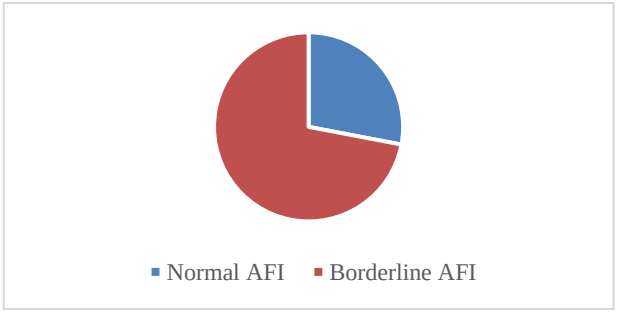

Figure 7: Number of NICU admission in both the groups.

Table 1: Outcome parameters.

Outcome parameters		Study group		Control group		P value (significance)
		N	%	N	%	
Abnormal CTG		3	15.78	4	28.57	0.04 (S)
Fetal distress		13	68.42	6	42.85	0.03 (S)
LSCS		19	21.11	14	15.55	0.03(S)
APGAR score<7	At 1 min	40	44.4	32	35.6	0.05 (NS)
	At 5 min	8	8.9	7	7.8	0.06 (NS)
Birth weight ≤2.5 kg		9	10	3	3.3	0.05 (NS)
NICU admission		26	28.8	10	11.2	0.04 (S)
PICU admission		7	7.78	5	5.5	0.06 (NS)
Perinatal mortality		13	14.44	6	6.67	0.02 (S)

Note: S-significant, NS-not significant.

DISCUSSION

The various outcome results are comparable to results of similar studies done both in India and abroad. Amniotic fluid volume is known to be reduced with advancing gestational age after 40 weeks.

Mean age was between 26-30 years 92.2% comparable to age 26.1 years in study by Ahmar et al and 25.8 years in the study done by Kaur et al.[2,18] In a study by Kumud et al 21-25 years and in study by Saxena et al mean age was 25.4 years.[1,14]

In present study the rate of pregnancy induced hypertension was 4.4% comparable to the study of Chate et al which was 8%.[12] Other studies by Saxena et al 54.29% patients were seen with PIH, Kumud et al 50%, Chandra et al 38.46% and Sriya et al 31%.[1,14-16]

In present study the percentage of LSCS in borderline AFI is 21.1% comparable to the study of Umber et al which is 32%.[17]

Other studies suggested following Saxena et al had 85.71% of LSCS rate, Chandra et al had a rate of 76.92%, Casey et al had 51% followed by Sriya et al and Guin et al 42.8%.[5,10,14-16] Grubb et al did not observe such association [no significant increase in intervention for fetal distress, either caesarean or operative vaginal delivery in patients with oligohydramnios (AFIs of 20 mm to 49 mm) when compared to those with normal amniotic fluid volume (AFI of 50 mm or more)].[3] Similarly Chauhan et al failed to find an increased risk of cesarean delivery for fetal distress or low APGAR scores in patients with oligohydramnios (Table 2).[7]

In present study fetal distress as an indication of LSCS was seen in 68.42% comparable to the study done by Kumud et al in which the rate was 58% and also a study done by Guin et al with a percentage of 80%.[1,10] Other studies of Chate et al it was 42%, study by Casey et al 48%, and Sriya et al 36.11% of LSCS with an indication of fetal distress.[5,12,17] In present study abnormal CTG as an indication of LSCS was seen in 15.78% where as in other studies like Chandra et al the rate was 69.23% followed by a study by Umber et al where the rate was 52.7%, Sriya et al 41.55% and in study by Chate et al 38%.[12,15-17]

Another indication for LSCS abruption placenta was comparable from the present study with a rate of 10% to the study by Chandra et al the rate was 7.69% and the study by Chate et al it was found to be 2%.[12,15]

In present study NICU admission for various morbidities like jaundice, septicaemia, IUGR, poor sucking reflex, birth asphyxia etc were 28.8% which is comparable to the study done by Saxena et al rate was 28.57%.[14]

Other studies, the study by Sriya et al had reported 88.8%, Chandra et al 46.15%, Chate et al 42%, Kumud et al 40%, Casey et al 7% and Umber et al 7% of NICU admissions in their studies.[1,5,12,16,17]

In present study the rate of low birth weight babies in reduced AFI group was found to be 10% comparable to the study done by Saxena et al 18%.[14]

Other studies by Chate et al it was found to be 62%, Chandra et al 61.53%, Sriya et al 58.38%, Umber et al 36.3% and Casey et al 35%.[5,12,15-17]

In present study it was reported that 44.4% babies had Apgar score <7 at 1 min which is comparable to the study by Guin et al which had a rate of 39%, study done by Sriya et al 38.88%.[10,16]

Other studies by Chate et al reported a rate of 30%, Kumud et al 20% and Umber et al 8%.[1,12,17] Accordingly in present study the babies with Apgar score less than 7 at 5 min were 8.8% comparable to the study by Sriya et al 9.72% and study by Umber et el 6%.[16,17]

Other studies like Chandra et al it was reported 23.07% and Chate et al 16%.[12,15] In present study the perinatal mortality seen in borderline AFI is 3.3% and none seen in normal AFI. The p value was 0.02 which means the perinatal mortality was attributed mainly due to borderline AFI and its complications. Study by Ahmar et al it was 7.7% and 7.2% in Wolff et al.[2,19]

Table 2: Comparison of cases in different studies according to antepartum complications, NST pattern, and percentage of LSCS.

S. no.		Chandra et al[15] (2000) (%)	Casey et al[5] (2000) (%)	Sriya et al[16] (2001) (%)	Umber et al[17] (2009) (%)	Guin et al[10] (2011) (%)	Chate et al[12] (2012) (%)	Saxena et al[14] (2020) (%)	Present study (%)
1.	**Antepartum complications**	-	-	-	-	-	-	-	-
	Hypertensive disorder	38.46	-	31	-	3.5	8	54.29	4.4
	Abruption placenta	7.69	-		-	-	2	-	10
	Fetal distress	-	48	36.11	-	80	42	3.33	68.42
2.	**Abnormal CTG**	69.23	-	41.55	52.7%	-	38	-	15.78
3.	**LSCS**	76.92	51	43.05	32%	42.8	64	85.71	21.1

Table 3: Comparison of perinatal morbidities.

Studies	Apgar score<7		Birth weight<2.5 kg	NICU admission
	1 min (%)	5 min (%)		
Casey et al[5]	-		35	7
Chandra et al[15]	-	23.07	61.53	46.15
Sriya et al[16]	38.88	9.72	58.38	88.88
Umber et al[17]	8	6	36.3	7
Guin et al[10]	39	-	-	-
Chate et al[12]	30	16	62	42
Saxena et al[14]	-	-	18	28.57
Present study	44.4	8.8	10	28.8

CONCLUSION

There is a significant association between operative deliveries in borderline amniotic fluid index group as compared to the normal AFI group at term. The operative delivery rates are higher in borderline AFI group, so associated maternal morbidity is more in this group. It is also observed that most common indication for lower segment caesarean section is fetal distress and number of Neonatal intensive care unit and PICU admission in this group were more as compared to the normal amniotic fluid index group. Perinatal mortality was more in the study group whereas none was seen in normal AFI group. Thus there is a significant association of amniotic fluid index with the maternal morbidity, perinatal morbidity and perinatal mortality. Determination of AFI can be used as an adjunct to other fetal surveillance methods. Determination of AFI is a valuable screening test for predicting intranatal fetal monitoring.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Bhangale S, Varsha Kose. Obstetric outcome of pregnancies with borderline versus normal amniotic fluid index at term: an analytical cross sectional study. Int J Reprod Contracept Obstet Gynecol 2022;11:1734-9.