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The relationship between borderline oligohydramnios and the outcome of a term pregnancy

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ABSTRACT

Background: Amniotic fluid contamination, foetal distress, newborn hypoxia, aspiration pneumonia, increased perinatal mortality, and unfavourable pregnancy outcomes may all result from oligohydramnios. Treating individuals with oligohydramnios in late pregnancy is crucial due to unusual clinical signs. The study's goals were to examine the perinatal outcome in cases of term pregnancy with borderline amniotic fluid index (AFI), as well as the mode of delivery, rate of operative interference, incidence of caesarean section, and foetal distress/non-reassuring foetal heart rate status.

Methods: From January 2018 to January 2019 (12 months), patients visiting the prenatal clinic at the department of obstetrics and gynaecology at Tirunelveli Government Medical College Hospital will participate in this prospective comparative research. Age, socioeconomic position, and demographic information were gathered, along with a thorough history that included the patient's symptoms, how long they lasted, menstruation and obstetric history, important prior events, and personal and family history. After applying exclusion criteria, 150 of the 265 instances with borderline oligohydramnios that were found were chosen for the research. **Results:** The two groups' APGAR scores. The borderline AFI group's mean APGAR score was 8.0 ± 0.9 , whereas the normal group's was 8.3 ± 0.7 . There was a statistically significant difference between the averages ($p < 0.01$).

Conclusions: It is acceptable to draw the conclusion that antepartum monitoring for borderline oligohydramnios is recommended in instances linked to foetal growth limitation or poor foetal development based on the cumulative analysis of many studies.

Keywords: aspiration pneumonia, amniotic fluid, oligohydramnios, and neonatal asphyxia

INTRODUCTION

About 4.5% of pregnancies result in oligohydramnios, while 0.7% of pregnancies result in severe oligohydramnios. Since the AFI often drops at term, oligohydramnios is more likely in pregnancies that continue beyond term.¹ Up to 12% of pregnancies longer than 41 weeks are complicated by oligohydramnios. The transparent liquid that surrounds the growing foetus in the mother's womb is called amniotic fluid. It plays an important part in foetal development by shielding the growing foetus from cord compression and acting as a cushion. It avoids intraamniotic sepsis because it is bacteriostatic. The exchange between the foetus, mother, and placenta determines the amount of amniotic fluid.² Polyhydramnios and oligohydramnios may be caused by disruptions in these regulations. Foetal well-being may be impacted by several illnesses, which are caused by pathological foeto-maternal circumstances. Real-time ultrasonography is used to measure the amount of amniotic fluid, allowing for early intervention if necessary. Foetal development is significantly influenced by the amniotic fluid, which envelops the growing foetus in the amniotic sac and provides protection and cushioning. Amniotic fluid helps avoid intraamniotic sepsis because it is bacteriostatic. Water exchange between the foetus, placenta, and mother determines the amounts of amniotic fluid.³ Oligohydramnios and polyhydramnios are caused by any aberrations from these regulating systems. Real-time ultrasonography has enabled the assessment of amniotic fluid levels. Oligohydramnios was defined by Phelan et al. as having an amniotic fluid index (AFI) of less than five. $AFI = 5.1 - 8$ cm indicates borderline oligohydramnios, whereas $AFI > 20$ cm indicates polyhydramnios. Research shows that women with borderline AFI had a higher frequency of unfavourable perinatal outcomes. Both the maternal and foetal compartments create amniotic fluid throughout the first half of pregnancy. Amniotic fluid is thus a dialysate that is similar to maternal and foetal plasma in the early stages of pregnancy but has a lower protein content.⁵ Water and other molecules may be transmitted throughout the first half of pregnancy by amnion-transmembranous flow, foetal skin-transcutaneous flow, or intra-membranous flow via foetal arteries. By the second trimester, the foetal skin has keratinised, making it impermeable for more diffusion to occur. Foetal pee is being used to make amniotic fluid.⁶ Severe oligohydramnios does not appear until 18 weeks in instances of foetuses with renal abnormalities because foetal urine production starts between 8 and 11 weeks gestation but only forms a significant component of amniotic fluid during the second trimester. Foetal urine has a hypotonic pH of 80–140 mg/liter.

Amniotic fluid is hence more hypotonic (250–260 most/liter). By term, the typical amount of amniotic fluid secreted is between 500 and 700 millilitres per day, and it starts to decrease around 40 weeks of gestation. Seven.

METHODS

The Tirunelveli Government Medical College Hospital served as the study's site. This prospective comparison research was conducted over the course of a year, from January 1, 2018, to January 31, 2019. In this research, women of term pregnancy with borderline AFI (5–8 cm) and those with normal AFI had their delivery methods and perinatal outcomes analysed and compared. The research comprised 150 women with normal AFI and 150 women with borderline AFI. After applying exclusion criteria, 150 of the 265 instances with borderline oligohydramnios that were found were chosen for the research. The first day of the most recent menstrual cycle or an ultrasound performed prior to 12 weeks of gestation were used to determine the gestational age. The accuracy of borderline AFI was assessed using an ultrasound report from a single clinician. AFI 8–24 cm was considered normal amniotic fluid content, but AFI 5–8 cm was considered borderline. To confirm borderline AFI, at least two sonographic measures were needed after 28 weeks.

Inclusion criteria

The mother's age (18–35 years), gestational age (37–42 weeks), singleton gestation with cephalic presentation, AFI 5–8 cm and AFI 8–24 cm as controls, and intact membranes were all taken into consideration for participation in the research.

Exclusion criteria

Gestational age <37 weeks, associated foetal malformation, ruptured membranes, multiple gestations, AFI <5 cm, post-term >42 weeks of gestation, malpresentation, uterine scar from a prior lower segment caesarean section (LSCS), myomectomy, and hysterectomy were among the criteria taken into consideration for exclusion from the study.

Pregnant women with normal AFI (8.1–24 cm) were chosen using the same inclusion and exclusion criteria. For the research, informed written permission was acquired. Adverse perinatal outcomes, such as intrapartum foetal distress, the presence of meconium-stained liquor during labour and delivery, APGAR scores 7 at 5 minutes, features of IUGR birth weight 10, oligohydramnios, which occurs in about 4.5% of all pregnancies, and severe oligohydramnios, which occurs in 0.7% of all pregnancies, were studied. Both groups were monitored during labour and delivery. Since the AFI often drops at term, oligohydramnios is more likely in pregnancies that continue beyond term.

Statistical analysis

Averages with regard to their continuous variables were used to characterise the research participants, borderline AFI and normal AFI. The student-independent "t" test was used to analyse the continuous variables between the groups. A suitable nonparametric test, such as χ^2 (Chi-square), was used to analyse the categorical variables, which were expressed as percentages. The IBM statistical package for the social sciences (SPSS) statistics-20 statistical package was used to carry out the aforementioned statistical operations. P values were deemed statistically significant if they were less than or equal to 0.05 ($p \leq 0.05$).

RESULTS

The current investigation was carried out in the obstetrics and gynaecology department between January 2018 and January 2019. A total of 300 women were recruited in the trial, which included 2100 births. Of them, 150 individuals with borderline oligohydramnios with an AFI between 5.1 and 8 cm were chosen for the study. There were 150 women in the borderline AFI group. For comparison, 150 women from the typical AFI group were chosen.

The age-wise incidence of normal AFI and borderline oligohydramnios in pregnant women is shown in Table 1. With a mean of 23.9 ± 3.9 years for normal individuals and 23.8 ± 3.6 years for women with borderline AFI, the maximum age-wise occurrence occurs between the ages of 20 and 24. The borderline AFI group had a mean gestational age of 39.3 ± 1.2 weeks, whereas the normal group had a mean of 39.4 ± 1.2 weeks. There was no

statistically significant difference between the two groups ($p>0.05$).

The comparison of the two groups' gravid is shown in Table 2. The findings showed that the two groups did not vary statistically significantly ($p>0.05$).

The parity between the two groups is contrasted in Table 3. Both groups' parity was not statistically significant ($p>0.05$). The two groups' delivery methods are contrasted in Table 4. Between the groups, there were typically 104 and 85 deliveries. Between the two groups, there were 25 and 18 assisted births. Both groups' LSCS were 21 and 47. There was a statistically significant difference ($p<0.01$) between the two groups. The two groups' LSCS indications are contrasted in Table 5. The borderline AFI participants had considerably higher caesarean section rates than the normal group owing to foetal distress and non-reassuring FHR (in cardiotocography), with strong statistical significance ($p<0.01$).

The MSAF rates for the two groups are contrasted in Table 6. The normal MSAF was 23.7%, whereas the positive MSAF was 15.7% of the boundary. There was a statistically significant difference between them ($p<0.01$).the differences in amniotic fluid meconium staining rates between the two groups. When compared to those with normal AFI, the borderline AFI group had greater incidences of MSAF.

The APGAR scores for the two groups are contrasted in Table 7. The borderline AFI group's mean APGAR score was 8.0 ± 0.9 , whereas the normal group's was 8.3 ± 0.7 . There was a statistically significant difference between the averages ($p<0.01$). Compared to those with normal AFI, the borderline AFI group had higher incidences of APGAR score <7 at 5 minutes.

Although this was not determined to be statistically significant, Table 8 demonstrates that the borderline AFI group had more NICU hospitalisations than the normal AFI group. Two newborn fatalities were noted in the women in the borderline oligohydramnios group. Meconium aspiration syndrome and birth asphyxia with hypoxic ischaemic encephalopathy were the causes of death. Women with normal AFI did not have any perinatal fatalities.

Table 1: Comparison of mothers' age between the two groups.

Age group (in years)	Normal		Borderline AFI	
	Frequency	Percentage	Frequency	Percentage
<20	14	9.3	13	8.7
20-24	72	48.0	80	53.3
25-29	51	34.0	46	30.7
30-34	13	8.7	11	7.3
Total	150	100.0	150	100.0
Mean±SD	23.9±3.9		23.8±3.6	
Significance	“t”=0.093, df=298, p=0.926			

Table 2: Comparison of gravida between the two groups.

Gravida	Normal		Borderline AFI		Total		Results
	No	%	No	%	No	%	
1	82	27.3	91	30.3	173	57.7	χ^2 1.369 df=3 P=0.713
2	48	16.0	44	14.7	92	30.7	
3	15	5.0	11	3.7	26	8.6	
4	5	1.7	4	1.3	9	3.0	
Total	150	50.0	150	50.0	300	100.0	

Table 3: Comparison of parity between the two groups.

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Parity	Normal		Borderline AFI		Total		Results
	No	%	No	%	No	%	
0	82	27.3	91	30.3	173	57.7	$\chi^2=1.369$ df=3 P=0.713
1	48	16.0	44	14.7	92	30.7	
2	15	5.0	11	3.7	26	8.6	
3	5	1.7	4	1.3	9	3.0	
Total	150	50.0	150	50.0	300	100.0	

Table 4: Comparison of mode of delivery between the two groups.

Mode of delivery	Normal		Borderline AFI		Total		Results
	No	%	No	%	No	%	
Normal	104	34.7	85	28.3	189	63.0	$\chi^2=12.991$ df=2 P=0.002
Assisted	25	8.3	18	6.0	43	14.3	
LSCS	21	7.0	47	15.7	68	22.7	
Total	150	50.0	150	50.0	300	100.0	

Table 5: Comparison of indication of LSCS between the two groups.

Indication for LSCS	Normal		Borderline AFI		Total		Results
	No	%	No	%	No	%	
Arrest of descent	0	0.0	3	4.4	3	4.4	$\chi^2=12.991$ df=2 P=0.002
CPD	7	10.3	10	14.7	17	25.0	
Deep transverse arrest	1	1.5	0	0.0	1	1.5	
Failure to progress	0	0.0	7	10.3	7	10.3	
Fetal distress	6	8.8	14	20.6	20	29.4	
Nonprogression of labour	5	7.4	0	0.0	5	7.4	
Non reassuring FHR	2	2.9	13	19.1	15	2.2	
Total	21	30.9	47	69.1	68	100.0	

Table 6: Comparison of MSAF between the two groups.

MSAF	Normal		Borderline AFI		Total		Results
	No	%	No	%	No	%	
-	126	42.0	103	34.3	229	76.3	$\chi^2=9.761$ df=1 P=0.002
+	24	8.0	47	15.7	71	23.7	
Total	150	50.0	150	50.0	300	100.0	

Table 7: Comparison of APGAR score between the two groups.

APGAR score	Normal		Borderline AFI	
	Frequency	%	Frequency	%
5	0	0.0	2	1.3
6	4	2.7	9	6.0
7	6	4.0	13	8.7
8	84	56.0	82	54.7
9	56	37.3	44	29.3
Total	150	100.0	150	100.0
Mean±SD	8.3±0.7		8.0±0.9	
Significance	“t”=2.623, df=298, P=0.009			

Table 8: Comparison of perinatal outcomes in both groups.

Comparison	Borderline oligohydramnios (%)	Normal liquor volume
Birth weight <2.5 kg	17 (11.3)	11 (7.3)
Apgar score <7 at 5 minutes of birth	11 (7.3)	4 (2.6)
NICU admission	19 (12.6)	10 (6.6)
Neonatal death	2	-

DISCUSSION

This prospective comparison research was carried out for a year at the obstetrics and gynaecology department of Tirunelveli Medical College Hospital. Two groups were created from the research population. Women with borderline AFI (5–8 cm) made up the first group, while those with normal AFI (5–25 cm) made up the second. Women were monitored throughout their prenatal and, most crucially, intrapartum periods. CTG was used to track their work progress. At the time of admission, all instances had spontaneous labour onset, which was let to continue on its own. None of the study population required labour inductions. When the women reached the active phase of labour, only syntocinon acceleration was performed. For every instance, partograms were plotted, and labour was well monitored. Women who had meconium staining of amniotic fluid with a comforting CTG pattern during the active phase of labour had amnio infusion. delivery weight, APGAR score, and NICU admission rates were all examined at the moment of delivery, and the postpartum period was monitored. A crucial component of prenatal foetal monitoring is the measurement of amniotic fluid content.⁸ When AFI measured between 8 cm, Camu et al., who first defined the notion of AFI, used the phrase "borderline amniotic fluid volume." the preference for the single deepest pocket approach over AFI estimate. Nonetheless, ACOG recommends AFI estimate as the most effective way to measure the amount of amniotic fluid, verifying our research in contemporary clinical contexts. Although these are the greatest non-invasive techniques now available for estimating amniotic fluid content, a Cochrane study also found that both approaches were equally ineffective in reducing unfavourable perinatal outcomes.⁹ 12.5% of participants in our research had borderline oligohydramnios. Meconium staining of amniotic fluid was a key sign of foetal distress. In our research, the rates of MSAF in women with borderline oligohydramnios during labour were 31.3%, which is greater than the rates in women with normal AFI. Ten According to research by Ehrental et al. and Conway et al., the rates of MSAF were 30.76% and 26.98%, respectively. According to these investigations, MSAF rates were greater in women with borderline oligohydramnios than in those with normal AFI.¹¹ Meconium staining of amniotic fluid did not significantly vary between women with borderline oligohydramnios and those with normal AFI, according to research by Nike et al.¹² In my research, women with borderline oligohydramnios had a higher rate of caesarean sections (31.3%), which was considerably greater than the rates for women in the normal AFI group.¹³ Research by Haas et al. found that women with borderline AFI had a 62% caesarean section rate, which was much greater than any other research. The fact that 12% of patients had elective caesarean sections due to oligohydramnios may help to explain this. According to Luo et al., the group with borderline oligohydramnios had a greater risk of caesarean sections. However, the borderline oligohydramnios group in their research did not have a higher rate of foetal discomfort or newborn fatalities.¹⁴ According to Hashimoto et al., women with borderline AFI had a 44% caesarean section rate for foetal distress, which was much greater than that of women with normal AFI. Because they are more likely to have foetal distress and need a caesarean section, women with borderline oligohydramnios need greater antepartum monitoring. The rates of growth-restricted newborns varied significantly between the two groups in terms of the perinatal outcome. Compared to mothers with normal AFI, those with borderline AFI had more growth-restricted kids.¹⁵ Additionally, Jamal et al. found that mothers with borderline oligohydramnios had a four-fold higher prevalence of growth-restricted kids. Compared to mothers with normal AFI (2.6%), women with borderline oligohydramnios had substantially more newborns with an APGAR score of less than 7 at five minutes of life (7.3%). Additionally, women with borderline oligohydramnios had a greater incidence of NICU admission (12.6%) than women with normal AFI (6.6%). However, there was no statistically significant difference between women with normal AFI and those with borderline AFI in terms of NICU hospitalisations.¹⁶ Although there was no change in the APGAR score, Jeng et al. also found a higher risk of NICU admission (19.05%). Women with borderline AFI reported two newborn fatalities, whereas those with normal AFI reported none. Even though the

variations in the perinatal death rate were not statistically significant, those with borderline AFI need to be closely monitored. According to ACOG, in addition to other pregnancy-related illnesses, oligohydramnios and polyhydramnios were among the conditions that required antepartum foetal observation. However, none of the cases listed as needing antepartum foetal observation included borderline oligohydramnios.¹⁷ Studies that show poor perinatal outcomes in situations with borderline oligohydramnios raise concerns about the need of increased antepartum monitoring in general in this age of value-based care. However, it is acceptable to draw the conclusion that antepartum monitoring for borderline oligohydramnios is recommended in instances linked to foetal growth limitation or poor foetal development based on the cumulative analysis of many research.^{18–20}

CONCLUSION

When compared to normal liquid volume, borderline oligohydramnios is linked to higher rates of amniotic fluid meconium staining, foetal discomfort, and caesarean delivery. Additionally, newborns with poor APGAR scores at five minutes, foetal growth restriction, and foetal discomfort are more likely. Therefore, in situations of borderline oligohydramnios, improved monitoring and greater antepartum surveillance are necessary to prevent unfavourable perinatal outcomes.

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