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ORIGINAL ARTICLE

Low amniotic fluid index at term as a predictor of adverse perinatal outcome.

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ABSTRACT… Objective: To assess the prevalence of adverse perinatal outcomes in antenatal women with low amniotic fluid index at term. **Study Design:** Observational Cross-sectional Analysis. **Setting:** Department of Gynaecology and Obstetrics Hayatabad Medical Complex, Peshawar. **Period:** 2nd February 2020, to 5th February 2021. **Methods:** The study involved a total of 165 patients, in 37 to 40-weeks of gestation period, the research included antenatal women with a low amniotic fluid index, with any parity, gravidity, and 18-35 years of age. While Excluded patients with any medical disorders during pregnancy (e.g., PIH, anemia, cardiac disease etc.), and those with gestational period <37 weeks from the study. Thorough history, clinical examination and ultrasound were carried out of all the women included in the study from OPD and emergency department, to confirm a low amniotic fluid index. Patient follow-up was extended to their arrival in the Obstetric suite during established labor, APGAR scores were calculated and recorded at birth, and at the 5-minute of birth for the neonate. Adverse Perinatal Outcome was considered positive if the APGAR Score was <7/10 at five minutes of life of neonate. Data analysis was performed using SPSS 23. **Results:** Out of 165 patients 57% of the patients were induced while 43% spontaneously delivered, similarly 66.7% were delivered vaginally while 33.3% were delivered via C Section. Low neonatal APGAR score was recorded in 67.9% patients which is a significant percentage, hence our study results showed positive correlation of low AFI with adverse perinatal outcome. We also observed that probability of satisfactory values of AFI is 1.5 times more in spontaneous deliveries (p=0.04, OR=1.5), however no such relation exists for period of gestation or number of parity. Similarly, there is a significant relation of mode of delivery with satisfactory values of AFI (p=0.00), however no such relation exists for period of gestation or number of parity. However, the probability of vaginal deliveries is 1.6 times more with an increased in number of para (p=0.02, OR=1.6). **Conclusion:** Reduced amniotic fluid index is linked with significant Unfavorable Perinatal Outcomes proved by low APGAR score (<7/10 at five minutes).

Key words: APGAR Score, AFI, Amniotic Fluid Index, Oligohydramnios.

INTRODUCTION

Phelan characterized oligohydramnios as an amniotic fluid index (AFI) equal to or less than 5cm, and defined borderline oligohydramnios as an AFI between 5 and 8 cm during the 36–42 weeks of pregnancy.[1] The incidence of oligohydramnios is approximately 1–5% at term, rising to more than 12% in pregnancies exceeding 40 weeks.[2] Women with oligohydramnios are at a heightened risk of abnormal fetal heart rate (FHR) tracings, an increased occurrence of fetal distress, and subsequently, a higher likelihood of undergoing caesarean sections.[3,4,5]

Furthermore, oligohydramnios serves as the primary indication for labor induction, which, in turn, elevates the rate of cesarean deliveries, particularly among Primigravid women with a cervix that is still in an unripe condition. Oligohydramnios is linked to an increased frequency of adverse events of pregnancy, escalating perinatal morbidity and mortality. The preferred technique for accessing amniotic fluid in pregnancy is the Amniotic Fluid Index (AFI), calculated as the cumulative measurement of the deepest pocket from each of the four quadrants. The normal AFI range is between 5-24 cm, with values exceeding 24 cm indicative of polyhydramnios, and values below 5 cm considered as oligohydramnios. A borderline AFI falls within the range of 5 to 8.[6,7]

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Therefore, using AFI assessment during antepartum or intrapartum periods can assist in identifying women requiring increased Monitoring for Pregnancy Complications. However, certain studies suggest that AFI alone is a limited Predictive Factor for Adverse Perinatal Outcomes, emphasizing that using oligohydramnios as the sole criteria for predicting perinatal outcomes is not advisable. Given this context, the present study aimed to investigate whether oligohydramnios can serve as a reliable predictor of adverse perinatal outcomes in non-complicated full-term Pregnancies.

METHODS

This was a descriptive (cross-sectional) research conducted at the Gynecology and Obstetrics Department of Hayatabad Medical Complex, Peshawar, spanning from 2nd February 2018, to 5th February 2019 the study was approved by ethical committee (107/20/EC/HMC). The research involved 165 antenatal women, in the 37 to 40-week of gestational period. Inclusion criteria encompassed women with a low amniotic fluid index, gestational age between 37-40 weeks, any parity and gravidity, and an age range of 18-35 years. Exclusion criteria includes patients with any medical disorders during pregnancy (e.g., PIH, anemia, cardiac disease), and those with gestational age <37 weeks. The study involved a thorough history and clinical examination (both as per abdominal and per vaginal) of all enrolled patients attended through OPD and emergency department of Hayatabad Medical Complex Peshawar. They also undergone obstetric ultrasound at the radiology department, to confirm a low amniotic fluid index. Patient follow-up was extended to their arrival in the Obstetric suite during established labor, characterized by cervical dilation exceeding 3 cm, accompanied by regular uterine contractions occurring at a rate of 3–4 per minute and lasting for at least 45 seconds. APGAR scores calculated at birth, and at the 5-minute were recorded for the neonate. Adverse perinatal outcomes were assessed based on low APGAR scores, with a positive indication if the APGAR score was <7/10 at five minutes of the neonate's life. Data analysis was performed using SPSS 23 and subsequently tabulated.

RESULTS

Out of 165 patients 57% of the patients were induced while 43%spontaneously delivered (Table-I). Similarly, 66.7%were delivered vaginally while 33.3% were delivered via C Section (Table-II). Low fetal APGAR score was recorded in 67.9% patients (Table-III) Hence our study results showed positive correlation of low AFI with adverse perinatal outcome. Low Amniotic Fluid Index has moderate uphill positive correlation with method of delivery. That means spontaneous deliveries would have good values for AFI as compared to induced delivery (p=0.001, r=0.3).

Similarly, Amniotic Fluid Index has moderate uphill positive correlation with mode of delivery. That means vaginal deliveries would have good values for AFI as compared to C-section deliveries (p=0.001, r=0.4) (Table-IV).

Using binary logistic regression, we observed that the probability of satisfactory values of AFI is 1.5 times more in spontaneous deliveries (p=0.04, OR=1.5), however no such relation exists for period of gestation or number of parity (Table-IV).

Using binary logistic regression, we observed that there is a significant relation of mode of delivery with satisfactory values of AFI (p=0.001), however no such relation exists for period of gestation or number of parity. However, the probability of vaginal deliveries is 1.6 times more with an increased in number of para (p=0.02, OR=1.6) (Table-IV).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Spontaneous	71	43.0	43.0	43.0
	Induced	94	57.0	57.0	100.0
	Total	165	100.0	100.0	

Table-I. Method of delivery of study patients (n=165)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Vaginal Delivery	110	66.7	66.7	66.7
	C Section	55	33.3	33.3	100.0
	Total	165	100.0	100.0	

Table-II. Mode of delivery of study patients (n=165)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low APGAR Score	112	67.9	67.9	67.9
	Normal APGAR Score	53	32.1	32.1	100.0
	Total	165	100.0	100.0	

Table-III. APGAR SCORE of study patients (n=165)

		Amniotic Fluid Index (AFI)	Method of Delivery	Mode of Delivery
Amniotic Fluid Index (AFI)	Pearson Correlation	1	.276**	.402**
	Sig. (2-tailed)		.000	.000
	N	165	165	164
Method of Delivery	Pearson Correlation	.276**	1	.040
	Sig. (2-tailed)	.000		.613
	N	165	165	164
Mode of Delivery	Pearson Correlation	.402**	.040	1
	Sig. (2-tailed)	.000	.613	
	N	164	164	164

**. Correlation is significant at the 0.01 level (2-tailed).

Table-IV. Correlations of AFI with method and mode of delivery (n=165)

DISCUSSION

The study enrolled a total of 165 patients, within the 37 to 40-week gestational period. The study excluded confounding factors such as extremes of age that could potentially impact the study results. Forty-three percent of patients (71 individuals) were in the age range of 24-29 years, with a mean age of 26 (SD 1.45). The mean amniotic fluid index was 3.12 (SD 1.32). Delivery methods varied, with 57% being induced and 43% delivering spontaneously. Vaginal delivery occurred in 66.7% of cases, while 33.3% involved Caesarean section. A low fetal APGAR score was noted in 67.9% of patients, indicating a positive correlation between low AFI and adverse perinatal outcomes.

The research uncovered a notable rise in the percentage of infants with low birth weight (< 2500 g) when oligohydramnios was present, corroborating findings from other researchers.[8,9,10] Schucker et al.[11] observed similar outcomes in a retrospective analysis of 136 women, suggesting that an amniotic fluid index of < 5 cm, although not very sensitive, predicts fetal growth restriction. However, there was no identified link between amniotic fluid status and the incidence of Cesarean delivery due to fetal distress or non-reassuring fetal testing.

The outcomes of the current study align with those of Phelan et al[12], who found no significant variations in fetal distress and Apgar scores in the borderline group compared to those with normal amniotic fluid. Jeng et al[13] demonstrated comparable results concerning meconium staining, Cesarean section for non-reassuring fetal heart rate, and 5-minute Apgar scores <7 in the borderline AFI. Baron et al. discovered no noteworthy differences in meconium staining, Cesarean section for fetal distress, birth weight <2500 g, 5-minute Apgar scores <7, and NICU admission. Kwon et al.[14] reported a higher incidence of perinatal outcomes, such as Small for Gestational Age (SGA), Cesarean section for fetal distress, 5-minute Apgar scores <7, and NICU admission in the borderline AFI group.

Low amniotic fluid index has moderate uphill positive correlation with method of delivery. That means spontaneous deliveries would have good values for AFI as compared to induced delivery and hence good fetal outcome in terms of good APGAR score is suggested by our study. (p=0.001, r=0.3).

Similarly, amniotic fluid index has moderate uphill positive correlation with mode of delivery. That means vaginal deliveries would have good values for AFI as compared to C-section deliveries (p=0.001, r=0.4) which is in line with the study findings of Chauhan et al metanalysis of 551 patients.

Using statistical test binary logistic regression, we observed that the probability of satisfactory values of AFI is 1.5 times more in spontaneous deliveries (p=0.04, OR=1.5), however no such relation exists for period of gestation or number of parity. Which means majority of patients with good AFI scores given vaginal births. Using binary logistic regression, we observed that there is a significant relation of mode of delivery with satisfactory values of AFI (p=0.001), however no such relation exists for period of gestation or number of parity. In this study we found that the probability of vaginal deliveries is 1.6 times more with an increased in number of parity which is probably an explanation to the fact that increase in parity did not affect fetal outcome in study population.

The reason for contradictory results with some studies discussed above may be due to variation in study designs and lack of standard prenatal and perinatal fetal care protocols as well as racial healthcare resource differences. Further studies are required to study the results of our research in a multicenter randomized control trial.

CONCLUSION

Reduced amniotic fluid index is linked with significant Unfavorable Perinatal Outcomes proved by low APGAR score (<7/10 at five minutes).

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

1. Brace RA, Wolf E. **Normal amniotic fluid volume changes throughout pregnancy.** Am JObstet Gynecol 1989; 161:382-8.

2. Gilbert WM, Brace RA. **Amniotic fluid volume and normal flows to and from the amniotic cavity.** Semin Perinatol. 1993; 17:150-7.

3. Gilbert WM, Newman PS, Eby-Wilkens E, Brace RA. **Technetium-99 m rapidly crosses the ovine placenta and intramembranous pathway.** Am J Obstet Gynecol. 1996; 175:1557-62.

4. Wintour EM, Shandley L. **Effects of fetal fluid balance on amniotic fluid volume.** Semin Perinatol. 1993; 17:158-72.

5. Sherer DM. **A review of amniotic fluid dynamics and the enigma of isolated oligohydramnios.** Am J Perinatol 2002; 19:253-66.

6. Brace RA, Vermin ~IL, lluijssoon E. **Regulation of amniotic fluid volume: Intramembranous solute and volume fluxes in late gestation fetal sheep.** Am. I Obstet Gynecol. 2004; 191837-46.

7. Cheung CY. **Vascular endothelial growth factor activation of intramembranous absorption: A critical pathway for amniotic fluid volume regulation.** The Journal of the Society for Gynecologic Investigation: JSGI. 2004 Feb; 11:63-74.

8. Magaan EF, Chauhan SP, Barrilleaux PS, Whitworth NS, Martin JN. **Amniotic fluid index and single deepest pocket: Weak indicators of abnormal amniotic fluid volumes.** Obstet Gynecol. 2000; 96: 737-40.

9. Magaan EF, Chauhan SP, Whitworth NS, Klausen JH, Saltzman AK, Morrison JC. **Do multiple measurements employing different ultrasonic techniques improve the accuracy of amniotic fluid volume assessment?** Aust NZ J Obstet Gynaecol. 1998; 38:172-5.

10. Veille JC, Penry M, Mueller-Heubach E. **Fetal renal pulsed Doppler waveform in prolonged pregnancies.** Am J Obstet Gynecol. 1993; 169:882-4.

11. Schuckeret MY, Marks AD, Henderson CE. **Longitudinal measurement of amniotic fluid index in postterm pregnancies and its association with fetal outcome.** Am J Obstet Gynecol. 1995; 172:142-6.

12. 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; 32:540-542.

13. Jeng CJ, Lee JF, Wang KG, Yang YC, Lan CC. **Decreased amniotic fluid index in term pregnancy.** Clinical significance. J Reprod Med. 1992; 37:789-792.

14. 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 Gynecol Res. 2006; 32:545-49.

AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Kalsoom Habib Khattak	Acquisition of data.	
3	Safoora	Analysis & interpretation.	
4	Aneela Mumtaz	Drafting & revising the article.	