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Assessment of Perinatal Outcomes in Pregnant Women with Borderline Amniotic Fluid Index

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ABSTRACT
Background: Antenatal testing is done to assess the health of the fetus and the likelihood of unfavorable consequences throughout pregnancy. Amniotic fluid is a crucial component of pregnancy that aids in the fetus's healthy growth, stimulates the development of its muscles and skeleton, and facilitates easier fetal movement.
Objective: The aim of this study was to assess the perinatal outcomes in pregnant women having borderline amniotic fluid index (AFI). **Patients and Methods:** This prospective case control study was conducted on all pregnant women who were enrolled from patients attending Zagazig university hospitals and Al-Ahrar teaching hospital for antenatal care. Patients were divided into two groups: 1- Group A: included 42 patients with normal AFI (8-22cm). 2- Group B: included 42 patients with borderline AFI (5-8 cm).
Results: There was highly statistically significant difference between two groups regarding Amniotic fluid index and the baby weight. Also, this study showed statistically significant difference between two groups regarding NICU. Regarding the correlations of AFI, there was highly statistically significant difference between amniotic fluid index and Gestational age (Week), Also, there were highly statistically significant differences between Amniotic fluid index and LIQUOR, and fetal distress syndrome.
Conclusion: It could be concluded that adverse perinatal outcome is seen in higher percentage of patients having oligohydramnios than that of borderline AFI.
Keywords: Perinatal Outcomes - Borderline Amniotic Fluid Index

INTRODUCTION

Antenatal testing is done to assess the health of the fetus and the likelihood of unfavorable consequences throughout pregnancy. Amniotic fluid is a crucial component of pregnancy that aids in the fetus's healthy growth, stimulates the development of its muscles and skeleton, and facilitates easier fetal movement [(1)].

Measuring the amount of amniotic fluid is essential for ensuring the fetus' survival, and the Amniotic Fluid Index (AFI) is the most used ultrasound-based technique for doing so [(2)].

Most studies describe oligohydramnios as having an AFI of 5 cm or less and demonstrating its related maternal and fetal problems. Regarding the borderline AFI range, there are several opinions. Phelan *et al.* in their study classified borderline AFI as being between 5 and 8 cm [(3)]. A borderline AFI is also described by Gumus and Miller as an AFI between 5.1 and 10 [(4)].

The aim of the work was to evaluate the fetal outcome of pregnancies with borderline amniotic fluid index.

PATIENTS AND METHODS

This prospective case control study included a total of 84 pregnant women, 42 had borderline AFI (case group) and 42 had normal AFI (control group), attending Zagazig university hospitals and Al-Ahrar teaching hospital for antenatal care.

The included subjects were divided into two groups; **Group 1 (control)** consisted of 42 pregnant women with normal AFI (8 – 22 cm) and **Group 2 (cases)** consisted of 42 pregnant women with normal AFI (5-8 cm).

Inclusion criteria:

Pregnant women who were attending the assigned hospitals for antenatal care and having the following criteria: (1) Medically free. (2) Single intra uterine viable pregnancy. (3) Gestational age more than 28w ± 0d. (4) AFI calculated to be between 5 and 8 cm. (5) AFI calculated to be between 5 and 8 cm. with normal AFI (8-22cm) or borderline AFI (5-8cm) was involved in our study (5) Patient is sure of her dates.

Exclusion criteria:

(1) Any maternal medical disease as diabetes mellitus, hypertension, cardiac diseases, thyroid diseases etc. either chronic or pregnancy complicated.
(2) Multiple gestations.
(3) Any evidence of active maternal or fetal infections.
(4) Patients with AFI less than 5 cm or more than 22 cm.
(5) Complicated pregnancy as placenta previa or placenta accreta.
(6) Evident rupture membranes.

All patients were subjected to thorough clinical evaluation with emphasis on:

1. Full medical and surgical history.
2. General clinical examination.
3. Ultrasound studies:
   - Trans-abdominal 2D ultrasound (GE Voluson 730 pro) at obstetric ultrasound unit at Zagazig University Hospitals.
   - Trans-abdominal 2D ultrasound (Medison – SonoAce R5) examination to assess for the

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amniotic fluid index (AFI) at AL-Ahrar Teaching Hospital.

- The AFI is measured by dividing the uterus into four imaginary quadrants. The linea nigra is used to divide the uterus into right and left halves. The umbilicus serves as the dividing point for the upper and lower halves. The transducer is kept parallel to the patient's longitudinal axis and perpendicular to the floor. The deepest, unobstructed, vertical pocket of fluid is measured in each quadrant in centimeters .The four pocket measurements are then added to calculate AFI.
- Study population patients was followed up prospectively every 2 weeks by 2D ultrasound measurement as usual standard antenatal care protocols up to the 36th week of gestation then weekly afterwards.
- At delivery, the perinatal outcomes were registered also signs of intra uterine growth restriction (IUGR), meconium stained amniotic fluid and CTG to assess for the variability and presence of accelerations and\or decelerations, baby 5 minute APGAR scoring ,need for incubator, time spent in incubator, neonatal death.

***Ethical Consideration*:**

This study was ethically approved by Zagazig University's Ethical Institutional Review Board. Written informed consent of all the participants was obtained after being informed of the research's goals. The study protocol conformed to the Helsinki Declaration, the ethical norm of the World Medical Association for human testing.

Statistical analysis

Data were gathered, reviewed, coded, and put into IBM SPSS version 20 of the Statistical Package for Social Science. Quantitative data were presented as mean, standard deviations, and ranges when their distribution was determined to be parametric, whereas qualitative data were given as numbers and percentages.

When the predicted count in any cell was less than 5, the comparison between two groups utilising qualitative data was made using the Chi-square test or the Fisher exact test in place of the Chi-square test. The Independent t-test was used to compare two independent groups with quantitative data and parametric distribution. The allowable margin of error was set at 5%, while the confidence interval was set at 95%. P value less than 0.05 was regarded as significant.

RESULTS

Table (1) shows that there were no statistically significant differences found between two groups regarding age of mother, gestational age of fetus (week) and parity**.**

Table (1): Comparison between Control group (no. =42) and Case group (no. =42) regarding Age of mother, Gestational age of fetus (Week) and Parity

		Control Group	Case group	Test value	P-value	Sig.
		No.= 42	No.= 42			
Age of mother (year)	Mean ± SD	24.12 ± 3.01	25.10 ± 3.78	-1.310•	0.194	NS
	Range	19 – 30	18 – 33			
Gestational age (Week)	28 – 37	3 (7.1%)	8 (19.0%)	2.615*	0.106	NS
	37 – Full term	39 (92.9%)	34 (81.0%)			
Parity	Multipara	21 (50.0%)	19 (45.2%)	0.191	0.662	NS
	Nullipara	21 (50.0%)	23 (54.8%)			

P-value >0.05: Non significant(NS); P-value <0.05: Significant(S); P-value< 0.01: highly significant(HS), *: Chi-square test, •: Independent t-test

Table (2) shows that there was highly statistically significant difference found between two groups regarding Amniotic fluid index**.**

Table (2): Comparison between Control group (no. =42) and Case group (no. =42) regarding Amniotic fluid index (cm)

Amniotic fluid index (cm)	Control Group	Case group	Test value	P-value	Sig.
	No.= 42	No.= 42			
Mean ± SD	13.81 ± 3.25	6.72 ± 0.85	6.951	0.000	HS

Table (3) shows that there was no statistically significant difference found between two groups regarding Induction of labor, fetal distress syndrome, meconium stained, abnormal fetal heart rate, APGAR, still birth and neonatal death, and there was statistically significant difference found between two groups regarding NICU, and there was highly statistically significant difference found between two groups regarding delivery and baby WT (kg)**.**

Table (3): Comparison between Control group (no. =42) and Patient group (no. =42) regarding Perinatal outcome

Perinatal outcome		Control Group		Case group		Test value	P-value	Sig.
		No.	%	No.	%			
Induction of labour	No	33	78.6%	36	85.7%	0.730*	0.393	NS
	Yes	9	21.4%	6	14.3%			
Fetal distress	No	37	88.1%	31	73.8%	2.779*	0.095	NS
	Yes	5	11.9%	11	26.2%			
Delivery	Normal	37	88.1%	17	40.5%	8.868	0..003	HS
	CS	5	11.9%	25	59.5%			
Meconium stained liquor	Clear	41	88.1%	39	19.0%	0.819*	0.365	NS
	Meconium stained	1	11.9%	3	81.0%			
Abnormal CTG	No	39	92.9%	36	85.7%	1.120	0.290	NS
	Yes	3	7.1%	6	14.3%			
APGAR	< 7	4	4.8%	4	9.5%	0.718*	0.397	NS
	7 - 9	38	95.2%	38	90.5%			
	Yes	0	0.0%	3	7.1%			
BABY WT (kg)	>10th centile for age	38	90.5%	27	64.3%	8.230*	0.004	HS
	< 10th centile for age	4	9.5%	15	35.7%			
NICU	No	38	90.5%	29	69.0%	5.974*	0.015	S
	Yes	4	9.5%	13	31.0%			
Still birth	No	42	100.0%	41	95.2%	1.049	0.152	NS
	Yes	0	0.0%	1	2.4%			
Neonatal death	No	42	100.0%	41	95.2%	1.049	0.152	NS
	Yes	0	0.0%	1	2.4%			

There was statistically significant difference found between amniotic fluid index and gestational age (Week), fetal distress syndrome, meconium stained and abnormal fetal heart rate (**Figures 1-4).**

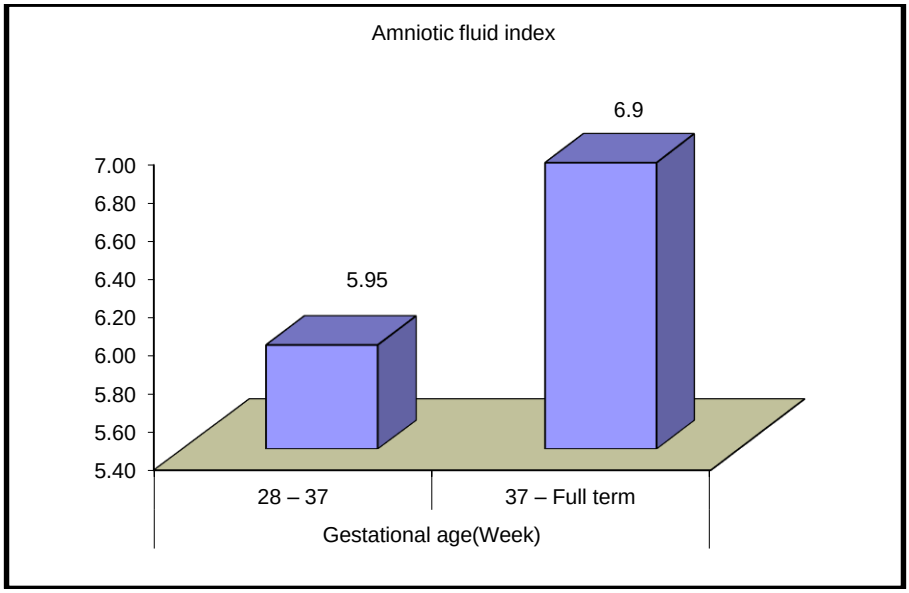

Figure (1): Relation between amniotic fluid index and parity, gestational age (Week)

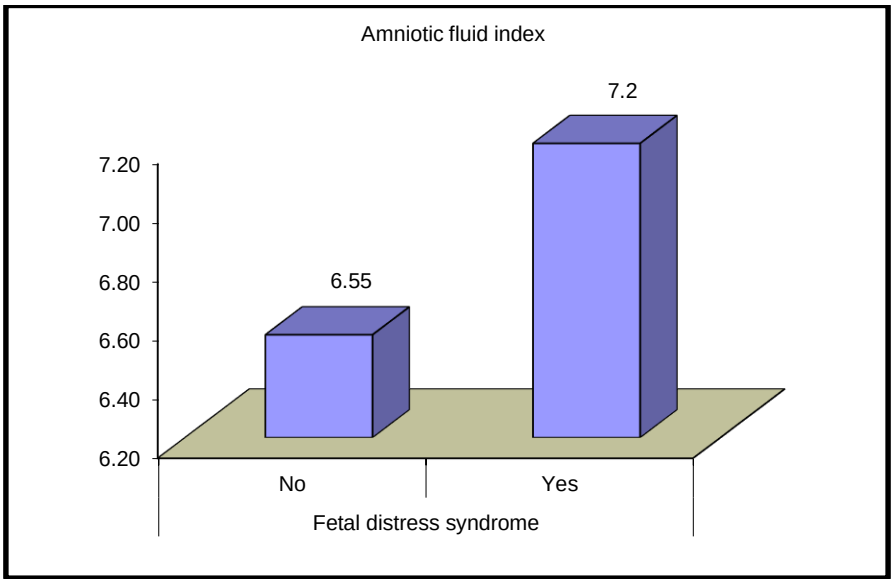

Figure (2): Relation between amniotic fluid index and parity, fetal distress syndrome.

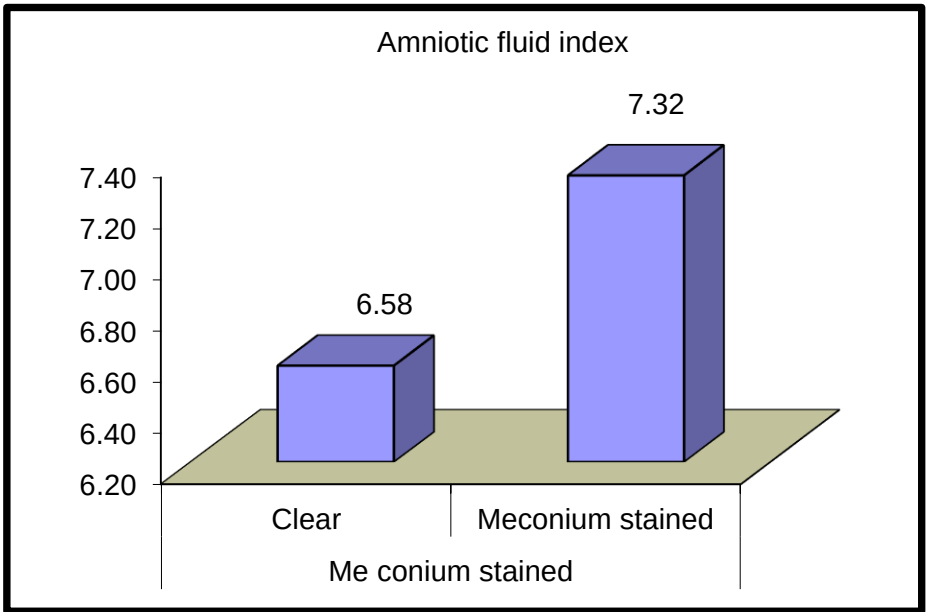

Figure (3): Relation between amniotic fluid index and parity, meconium stained.

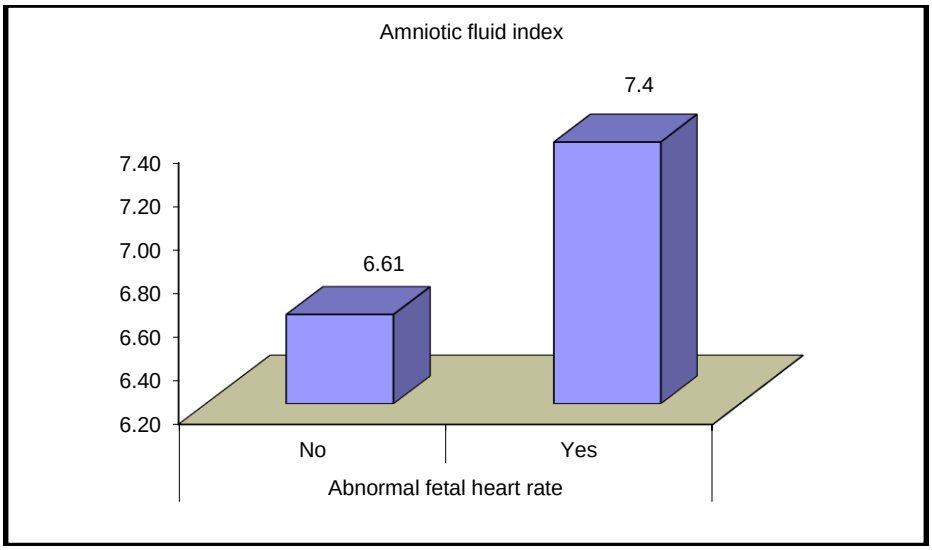

Figure (4): Relation between amniotic fluid index and parity, abnormal fetal heart rate

Receiver operating characteristic curve (ROC) shows that the best cut off point of amniotic fluid index to detect patient group was found <=7.9 with sensitivity of 92.86%, specificity of 78.57%, PPV of 81.3%, NPV of 91.7% and total accuracy of 0.82 **(Table 4 and figure 5)**.

Table (4): ROC curve (Patient and Control) group regarding amniotic fluid index at gestational age 28 – full term

	Cut off point	AUC	Sensitivity	Specificity	+PV	-PV
Amniotic fluid index(cm)	≤7.9	0.82	92.86	78.57	81.3	91.7

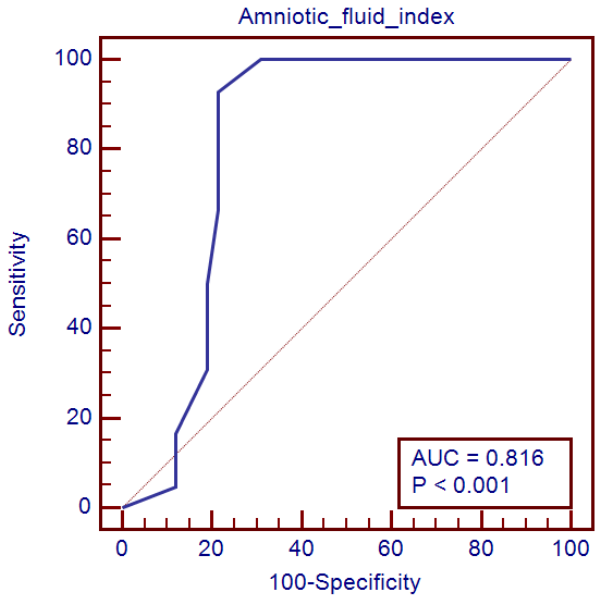

Figure (5): ROC curve (Patient and Control) group regarding amniotic fluid index at gestational age 28 – full term.

DISCUSSION

Regarding the correlations of AFI, there was highly statistically significant difference between amniotic fluid index and LIQUOR, and there was statistically significant difference between amniotic fluid index and fetal distress syndrome.

Rabei *et al.* [5] studied the correlation between serial amniotic fluid index changes and adverse fetal outcome in post term pregnancies and found that prominent changes in the amniotic fluid index had no association with adverse fetal outcome irrespective of the rate of change, provided, the final value remained > 5 cm and significant fetal heart rate decelerations and meconium was detected in patients whose final AFI was< 5 cm.

Also, **Chandra *et al.*** [6] compared pregnancies with low AFI and normal AFI on routine intrapartum amniotic fluid volume assessment and found that the variable decelerations and caesarean delivery for fetal distress occurred more in oligohydramnios because of less number of women who had crossed 40 weeks of gestation and there was no difference in Apgar score or neonatal complications between two groups.

Swati and Vyas [7] in the analysis of 136 pregnancies which were complicated by severe preeclampsia concluded that there is no association between the amniotic fluid index and caesarean sections for non-reassuring fetal testing. However the study group had a large number of preterm patients and they also concluded that for women with severe preeclampsia remote from term, AFI < 5 cm is predictive of intrauterine growth restriction but lacks sensitivity.

Naveiro-Fuentes *et al.* [8] has analyzed whether the isolated oligohydramnios in term pregnancies is a clinical entity and have concluded that isolated oligohydramnios in normal term pregnancy does not indicate fetal compromise. So most women with isolated oligohydramnios, labour induction may not be needed as it merely increases the rate of caesarean section.

In **Karahanoglu *et al.*** [9] study, which was on the effect of fetal presentation on amniotic fluid index and concluded that the presentation of the fetus should also be considered in evaluating amniotic fluid index. Successful version from breech to cephalic presentation resulted in significant increase in amniotic fluid index.

Chouhan *et al.* [10] study also analyzed 42 reports on amniotic fluid index published between 1987 to 1997 and concluded that AFI of 5 cm or less significantly increases the risk of either LSCS or fetal distress or low 5 min Apgar score (<7).

Most of the cases and controls were belonging to age group 18-33 years i.e. cases 52% and controls 51%.

The mean age of cases was 24.12±3.01 years in cases and 25.10 ± 3.78 years for controls. Present study results corroborate with the results of the studies done by **Naveiro-Fuentes *et al.* [8]** found mean age of 28.4±3.4 years, **Jagatia *et al.* [11]** found mean age of 23.9 years, **Hindumati *et al.* [12]** found mean age of 22.5 years and **Sangeeta *et al.* [13]** found mean age of 23.1 years in cases and 22.6 years in controls.

Sixty nine women were induced and 15 were failed induction in the cases, while only 1 woman was induced in the controls. The decision for induction or allowing for spontaneous labor was taken depending upon the stage of labor, favorability of the cervix and AFI. Study done by **Sangeeta *et al.* [13]** reported 56% induction in cases and 36% induction in controls; they have shown a higher incidence of induction in comparison to our study.

CONCLUSION

Adverse perinatal outcome is seen in higher percentage of patients having oligohydramnios than that of borderline AFI.

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Competing interests: Nil.

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