

Oligohydramnios and fetal outcome in term pregnancy

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Abstract

Background and objective: Oligohydramnios is defined as an amniotic fluid index less than 5th centile for gestation. It presents a threat to the fetus and has been correlated with increased risk of intrauterine growth retardation, meconium aspiration syndrome, severe birth asphyxia, low APGAR scores, and congenital abnormalities. It is associated with perinatal morbidity and mortality and maternal morbidity in a significant number of cases. Therefore, early detection of oligohydramnios and its management is important. This study aimed to determine the perinatal and maternal outcomes in oligohydramnios.

Methods: This retrospective cohort study was carried out at the Maternity Teaching Hospital in Erbil from March 2018 to March 2019. A total of 300 patients were recruited, including 150 pregnant women with oligohydramnios and 150 with normal amniotic fluid index.

Results: There was a significant difference between the oligohydramnios group and the comparison group in relation to parity and gestational age. Oligohydramnios was more among primigravids. The rate of cesarean section was higher in oligohydramnios group compared to the comparison group. Intrauterine growth retardation among oligohydramnios group was 13%. Oligohydramnios was associated with birth weight <2500 gm (21.3%).

Conclusion: Antepartum diagnosis of severe oligohydramnios at term was associated with an increased cesarean section rate, a higher rate of admission of neonatal care unit, and low birth weight. Therefore, antepartum oligohydramnios is associated with increased perinatal morbidity and mortality.

Introduction

Amniotic fluid is a dynamic component that is continuously and closely related to both the mother and the fetus.¹ Oligohydramnios is a common complication of pregnancy that 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 labor, meconium aspiration syndrome, severe birth asphyxia, low APGAR scores, neonatal intensive care unit admission, congenital abnormalities, and stillbirths. Amniotic fluid surrounds the fetus in intrauterine life, providing protective, low-resistance space suitable

for growth and development.^{2,3} Now, it is universally accepted that an adequate amniotic fluid volume is an essential prerequisite for normal intrauterine development and good fetal outcome.^{4,5} Amniotic fluid is a net result of the inflow and outflow of fluid into the amniotic cavity. In early pregnancy, the amniotic fluid comes from the passive transport of water from amnion into amniotic space and active transport of solute. Later in pregnancy, from the second trimester onwards, it is produced from fetal urine, secretion from the respiratory tract.^{2,3} Transfer of fluid across the chorionic plate and umbilical cord (intramembranous flow) and movement of fluid directly between the

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amniotic cavity and maternal blood across the wall of the uterus (trans membranous flow) all contribute to the amniotic fluid volume.³ In a normal pregnancy, the amount increases by a maximum of 10 ml/day, usually decreases at term, and ranges between 1000-1200ml.³ A peak amniotic fluid index is at 32 weeks of gestation, followed by a steady decline until 42 weeks.⁶ This fluid plays a vital role in proper fetal development while its deficiency leads to oligohydramnios sequence or potter sequence (bilateral renal agenesis) characterized by an irregular appearance of the fetus and is not compatible with postnatal life, stillborn showing stigmata of prenatal renal failure and oligohydramnios.^{7,8} Definition of oligohydramnios is based on sonographic criteria oligohydramnios defined as an amniotic fluid index less than 5th centile for gestation,² or amniotic fluid index ≤ 5 cm,⁹ or DVP less than 2 cm.³ The onset is usually occurring during the latter part of the third trimester, often when one is overdue. Less commonly occurs in early pregnancy, but if it occurs will have a poor prognosis.^{2,3} The amniotic fluid index alters throughout gestation, but it should be between 10 and 25 cm in the third trimester. Values below 10 cm indicate a reduced volume, and those below 5 cm indicate oligohydramnios.^{1,2,9,10} It complicates approximately 3.9 of pregnancies.³ Severe oligohydramnios represented by diminished amniotic fluid volume. The etiological factors of severe oligohydramnios include fetal malformation most often involving the genitourinary tract, chromosomal abnormality, premature rupture of membrane, placental insufficiency, and drugs example NSAID and ACEI.^{1,3,11} This study aimed to determine the association between amniotic fluid index with the mode of delivery and indication of cesarean section and association of amniotic fluid index with the birth outcome.

Methods

This is a retrospective cohort study carried out at the Maternity Teaching Hospital in Erbil city from 1st March 2018 to the 1st March 2019. It included 300 pregnant women with a singleton pregnancy and gestational age from 37 completed weeks till 42 weeks; 150 women were oligohydramnios and 150 normal. Exclusion criteria included multiple pregnancy, intrauterine death, pregnant women with a ruptured membrane, oligohydramnios less than 37 weeks gestation, and pregnant women with previous two or more cesarean sections. Oligohydramnios patients were recruited from the labor room after detailed history and examination. The data were obtained from patients themselves by direct interview using a specially designed questionnaire after explanation and obtaining written consent from each participant. The questionnaire included name, age, phone number, parity, gestational age at presentation, amniotic fluid index, mode of delivery, indications of cesarean section, and birth outcome. Parity was classified as primigravid, multiparas (1-4), grand multiparas (≥ 5). Indications of the cesarean section included the failure of progress, previous cesarean section, history of infertility, fetal distress, antepartum hemorrhage, and abnormal presentation. The birth outcome included alive, fresh still death, or macerated still death. It also included birth weight, obvious congenital anomaly, admission to neonatal care unit, and APGAR score at the first and fifth minutes. Data were analyzed using the statistical package for the social sciences (version 22). Chi-square test of association was used to compare proportions. Fisher's exact test was used when the expected count of more than 20% of the cells of the table was less than 5. The student's test of two independent samples was used to compare two means. A *P* value of ≤ 0.05 was considered statistically significant.

Results

The total sample size of the study was 300 women, 150 with oligohydramnios (cases), and 150 women with a normal amount of amniotic fluid (the comparison group). Table 1 shows that 18.7% of the cases aged ≥ 35 years compared with 8% of the comparison group ($P = 0.007$).

The proportion of grand-multipara among cases (32.7%) was significantly higher than the proportion (13.3%) among the comparison group ($P < 0.001$). The proportion of cases with a gestational age of 41 weeks (46.7%) was significantly higher than the proportion (12%) among the comparison group ($P < 0.001$).

Table 1: Association between amniotic fluid index with age, parity, and gestational age.

	Amniotic fluid index						<i>P</i> value
	Normal		Oligohydramnios		Total		
	No.	(%)	No.	(%)	No.	(%)	
Age							
< 25	38	(25.3)	45	(30.0)	83	(27.7)	
25-34	100	(66.7)	77	(51.3)	177	(59.0)	
≥ 35	12	(8.0)	28	(18.7)	40	(13.3)	0.007
Parity							
Primiparity	49	(32.7)	64	(42.7)	113	(37.7)	
Multiparity	81	(54.0)	37	(24.7)	118	(39.3)	
Grand multiparity	20	(13.3)	49	(32.7)	69	(23.0)	<0.001
Gestational age							
38	35	(23.3)	29	(19.3)	64	(21.3)	
39	97	(64.7)	51	(34.0)	148	(49.3)	
41	18	(12.0)	70	(46.7)	88	(29.3)	<0.001
Total	150	(100.0)	150	(100.0)	300	(100.0)	

Table 2 shows no significant ($P = 0.100$) difference between the mean age of cases (28.19 years) and that of the comparison group (27.11 years). However, there was a significant difference ($P < 0.001$) between the mean gestational age of cases (39.74 weeks) and that of the comparison group (39.01 weeks). The rate of cesarean section among the cases (76.7%) was significantly higher ($P < 0.001$) than the rate among the comparison group (22.7%), as

presented in Table 3. The table shows that 13% of those who underwent cesarean section among cases had intra-uterine growth retardation (IUGR), while none of the comparison group had IUGR. The main indications for cesarean section were fetal distress (27.8% and 38.2% for cases and comparison groups respectively), and abnormal presentation (21.7% vs. 29.4%). The other indications are presented in Table 3.

Table 2: Means of age and gestational age by amniotic fluid index.

	Amniotic fluid index				P value
	Normal		Oligohydramnios		
	Mean	(± SD)	Mean	(±SD)	
Age of patients	27.11	(±4.76)	28.19	(±6.52)	0.100
Gestational age	39.01	(±0.85)	39.74	(±1.23)	<0.001

Table 3: Association between amniotic fluid index with the mode of delivery and indications of cesarean section.

	Amniotic fluid index						P value
	Normal		Oligo-hydramnios		Total		
	No.	(%)	No.	(%)	No.	(%)	
Mode of delivery							
Cesarean section	34	(22.7)	115	(76.7)	149	(49.7)	<0.001
Vaginal delivery	116	(77.3)	35	(23.3)	151	(50.3)	
Total	150	(100.0)	150	(100.0)	300	(100.0)	
Indication of Cesarean section							
FOP	8	(23.5)	18	(15.7)	26	(17.4)	0.031*
Previous cesarean section	1	(2.9)	15	(13.0)	16	(10.7)	
History of infertility	2	(5.9)	3	(2.6)	5	(3.4)	
IUGR	0	(0.0)	15	(13.0)	15	(10.1)	
Fetal distress	13	(38.2)	32	(27.8)	45	(30.2)	
APH	0	(0.0)	7	(6.1)	7	(4.7)	
Abnormal presentation	10	(29.4)	25	(21.7)	35	(23.5)	
Total	34	(100.0)	115	(100.0)	149	(100.0)	

*By Fisher's exact test.

Table 4 shows that 21.3% of the neonates of the cases were of low birth weight of less than 2500 grams, compared with the neonates of the comparison group ($P < 0.001$). No significant differences were detected between the two groups regarding the development of the congenital anomalies ($P = 0.501$). Around one quarter (25.3%) of the neonates of the cases were

admitted to the NCU compared to 3.3% of the neonates of the comparison group ($P < 0.001$). Around one quarter (24.7%) of the neonates of the cases had an APGAR score of less than 7 in the first minute of life compared with 10% of the neonates of the comparison group ($P = 0.001$). All the neonates had an APGAR score of more than 7 in the fifth minute of life.

Table 4: Association between amniotic fluid index with birth outcomes.

	Amniotic fluid index						P value
	Normal		Oligohydramnios		Total		
	No.	(%)	No.	(%)	No.	(%)	
Birth weight							
> 2500	142	(94.7)	118	(78.7)	260	(86.7)	
< 2500	8	(5.3)	32	(21.3)	40	(13.3)	<0.001
Obvious congenital anomaly							
Yes	3	(2.0)	6	(4.0)	9	(3.0)	
No	147	(98.0)	144	(96.0)	291	(97.0)	0.501*
Admission to NCU							
Yes	5	(3.3)	38	(25.3)	43	(14.3)	
No	145	(96.7)	112	(74.7)	257	(85.7)	<0.001
APGAR in first minute							
> 7	135	(90.0)	113	(75.3)	248	(82.7)	
< 7	15	(10.0)	37	(24.7)	52	(17.3)	0.001
APGAR in fifth minute							
> 7	150	(100.0)	150	(100.0)	300	(100.0)	NA
Total	150	(100.0)	150	(100.0)	300	(100.0)	

*By Fisher's exact test

Discussion

In this study, maternal age is regarded as a risk factor for developing oligohydramnios. This finding is not similar to the Melamed study,¹³ in which there was no significant difference between studied cases and the comparison group in regard to maternal age. In the current study, the incidence of oligohydramnios increases with advancing gestation age at 41 weeks, which was (46.7%) and on the bases that amniotic fluid index alters throughout gestation,² but disagreed with the study of Melamed.¹³ Regarding the parity, the primigravida was more liable to develop oligohydramnios (42.7%), which agrees with the Jagatia study.¹⁴ However, it does not agree with the study of Melamed¹³ in which there was no association between parity and oligohydramnios. In this study, the rate of cesarean section in studied cases (76.7%) was high if compared with the comparison group (23.3%). Jandial et al.¹⁶ agreed with our study in that the rate of cesarean section in the cases group increased compared to the comparison group. In the current study, the indications to perform cesarean section were fetal distress (27.8%), abnormal presentation (21.7%), and IUGR (defined as sonographically estimated fetal weight below 10th percentile)¹³ (13%). This was similar to the results obtained by Jagatia,¹⁴ in which the reasons to perform cesarean section were fetal distress and IUGR. In the current study, the incident of low birth weight (less than 2500 gm)⁸ was higher in oligohydramnios group (21.3%) compared to the comparison group, which was statistically highly significant. This finding was in agreement and comparable with the result of Chate,¹⁰ (62%) and another Indian study (Sriya et al.)¹⁷, in which the occurrence of low birth weight was 58.38%, and Umber et al.¹⁸ (36.3%). APGAR score (Appearance, Pulse, Grimace, Activity, Respiration), is a simple and replicable method to quickly assess the health of newborn children immediately after birth.⁸ In the first minute in this study, there was

a significant difference between the two groups. APGAR score <7 was more among those with oligohydramnios (24.7%) compared to 10% in the comparison group. This result was similar to the result of Umber et al.¹⁸, Chate¹⁰ and Guin et al.,⁹ in which there was an increased chance of low APGAR score at 1st minute in the presence of severe oligohydramnios and disagreed with the result of a study done by Jandial et al.¹⁶ Regarding admission to the neonatal intensive care unit, in this study, there was a significant difference between oligohydramnios group (25.3%) and the comparison group (3.3%). Other studies (Chate,¹⁰ Sriya et al.,¹⁷ Jagatia,¹⁴ and Jhonson et al.¹⁵) showed a significant increase in the chance of neonatal intensive care unit admission. However, Manzanares et al.,¹² showed no significant difference between the two groups.

Conclusion

Oligohydramnios is a frequent occurrence and demands intensive fetal surveillance and proper antepartum and intrapartum care. Amniotic fluid index is an important component of biophysical profile scoring. Its assessment in the early third trimester helps to identify women who need more antepartum surveillance so that proper management can be done to improve maternal and perinatal outcomes. Due to intrapartum complications and a high rate of perinatal morbidity and mortality, the cesarean section rates are rising. However, the decision between vaginal delivery and cesarean section should be well balanced to prevent unnecessary maternal morbidity.

Competing interests

The authors declare no competing interests.

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