



## Original Article

### The Relationship between Isolated Oligohydramnios at Term and Labor Mode: A Prospective-Observational Study



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## Abstract

**Objective:** To assess the relationship of between isolated oligohydramnios at the last few weeks of pregnancy with mode of delivery and evaluate its role in failure of induction of labor and its role in increase rate of caesarian section.

**Study design:** This is a prospective-observational study included 70 pregnant women, 35 of them with normal amount of liquor (control group), and the other 35 pregnant women with isolated oligohydramnios diagnosed according to ultrasound criteria (amniotic fluid index (AFI) of 5 cm, single deepest pocket of 2 cm) (study group), all pregnant women at (37-40 weeks) of gestation, attended the ante-natal care unit (ANC) unit in Nu'man teaching hospital and the outpatient private clinics in Hay Aljameaa/ Al-Harthya in Baghdad from December 2020 till April 2021.

**Results:** Study group includes 35 pregnant women with isolated oligohydramnios and the control group includes 35 pregnant women with normal AFI after matching of other inclusion criteria (maternal age, parity and gestational age) for both groups, there is a significant difference between the study and control group in mode of delivery as the highest percent of women with IO delivered by cesarean section (68.57%) while the highest percent of women with normal AFI delivered vaginally (74.29%). There is a statistical difference in the rate of cesarean section due to abnormal doppler study before induction of labor ( $p$  value= 0.0500), there is significant difference in mean birth weigh between both study groups ( $P$ -value= 0.0380), with the statistically significant differences in Apgar score at 1 minute and 5 minutes  $\geq 7/10$  ( $P$ -value = 0.0047, 0.0253) respectively. With high level of significance about neonatal intensive care unit admission (NICU) > 24 hrs ( $P$ -value= 0.0110).

**Conclusions:** Pregnancies with isolated oligohydramnios are associated with increased rate of development of fetal distress, meconium-stained liquor, rate of caesarean delivery, NICU admission and low birth weight. Rate of cesarean for fetal distress is increased because of increased rate of induction of labor in women with oligohydramnios. The study does not suggest any root for delivery of pregnancies with IO, It is better to give the patient chance of spontaneous labor (if there is no fetal distress) with close monitoring for the fetal heart rate during labor. Cesarean section is indicated for IO with fetal distress at any stage of labor to decrease perinatal morbidity and mortality. Further studies may be required to evaluate the long-term consequences of isolated oligohydramnios.

**Key words:** Isolated oligohydramnios, mode of delivery, induction of labor, caesarian section

## **Introduction**

Amniotic fluid is a clear, slightly yellowish liquid that surrounds the fetus during pregnancy. It is contained in the amniotic sac, Amniotic fluid is mostly water with electrolytes at first few weeks of gestation, but by the 12-14th week, it also includes proteins, carbohydrates, lipids and phospholipids, and urea, all of which help in the development of the fetus. [1]

Amniotic fluid is generated from fetal and probably maternal compartments during the first half of pregnancy. Water and solutes readily pass through the fetal skin, and also the amnion and chorion. In early pregnancy, amniotic fluid is a dialysate that is similar to fetal and maternal plasma but has lower protein content, during this period; the amniotic fluid has linear relation with fetal size. Early in the second trimester, almost entirely through urine, the fetus contributes to the amount and composition of amniotic fluid. On this part of pregnancy, the amount of

amniotic fluid changes its linear relationship from fetal size previously to gestational age. [1, 2]

The amniotic fluid plays a vital role in fetal health and development as it has many functions like protection of the fetus from trauma, prevention of the umbilical cord from being compressed, and providing the fetus the freedom to move and mature. Its bacteriostatic activity also aids in the prevention of the intra-amniotic infection. [2]

The volume of amniotic fluid reaches its peak at 34 weeks (gestation), when it averages 800 ml, while at full term (40 weeks gestation), the infant is surrounded by around 600 mL of amniotic fluid. [1] Abnormal amounts of amniotic fluid may be idiopathic or caused by wide variety of fetal and/or maternal abnormalities, and may effects fetal and pregnancy outcomes.

Oligohydramnios is a condition in which the amniotic fluid volume is lower than predicted for the gestational age. It's usually detected with an ultrasound and

can be characterized subjectively (e.g., reduced amniotic fluid volume) or quantitatively (e.g., amniotic fluid index of 5 cm, single deepest pocket of 2 cm). In patients who are at least 24 weeks pregnant with a singleton pregnancy, the amniotic fluid index is applied.[3, 4] According to reports, it can complicate about 5% of all pregnancies. [5]

Oligohydramnios can happen at any stage during pregnancy, although it's most frequent in the third trimester. It may be caused by one of the following: Placental causes If the placenta isn't supplying adequate nutrients to the fetus, the infant may discontinue recycling fluid, Congenital malformations can pose problems with the fetal urinary system and kidneys, resulting in inadequate urine output and then oligohydramnios, Frank rupture of fetal membranes, Amniotic fluid leakage, post-date pregnancy and Maternal complications such as maternal dehydration, hypertension, preeclampsia, diabetes, and chronic hypoxia. [4, 6, 7]

In this study we deal with certain entity of oligohydramnios which is isolated oligohydramnios.

Isolated oligohydramnios (IO) is defined by the existence of oligohydramnios in the absence of fetal anatomical and chromosomal defects, fetal growth restriction, intrauterine infection, and recognized maternal causes. [8]

The most common complications of oligohydramnios are low birth weight, fetal distress and increase fetal mortality, as well as intrauterine growth restriction and other fetal complications, Neonatal Intensive Care Unit (NICU) admission. Meconium aspiration and newborn sepsis were the leading causes of neonatal morbidity in addition to increased caesarian section rate and instrumental delivery. [5]

An irregular antepartum fetal heart rate (FHR), meconium stained fluid, an Apgar score less than 7, or NICU hospitalization were all correlated to oligohydramnios. Also, individuals with an AFI of 5.0 cm or below had a greater

incidence of fetal distress requiring a cesarean section. [9]

Some studies found that the single risk of isolated oligohydramnios at term is small for gestational age newborn. [10, 11] IO appears to have a stronger impact on increasing rate of operative intervention and induction of labor. [12]

Induction of labor is an appropriate technique to lower the risk of perinatal morbidity and mortality in women who identify with isolated term oligohydramnios, some studies have shown that when evaluating induction of labor because of term oligohydramnios and other reasons with normal amniotic fluid volume, pregnancy outcomes are similar.[13]

While a few studies found that the incidence of cesarean delivery for fetal distress was greater in pregnant women with an AFI of 5.0 cm or below, other studies found that no change in cesarean section rate in patients with IO. [9, 11]

## **Methods**

This is a prospective case-control study included 70 pregnant women, 35 of them with normal amount of liquor (control group), and the other 35 pregnant women with isolated oligohydramnios diagnosed according to ultrasound criteria (amniotic fluid index of 5 cm, single deepest pocket of 2 cm) (study group) , all pregnant women at (37-40 weeks) of gestation, attended the ante-natal care (ANC) unit in Nu'man Teaching Hospital and the outpatient private clinics in Hay Aljameaa/ Al-Harthya in Baghdad from December 2020 till April 2021.

The research protocol was reviewed and approved by the scientific committee in the college of Medicine /Al-Iraqia University and the Ministry of Higher Education.

Sample size:: Total sample size was 70 cases, half of them are pregnant women between 37-40 weeks of gestation with normal AFI (5-15 cm) those represent control group, and the other half had AFI < 5cm, represent study group.

For the study group, 43 women have been diagnosed with isolated oligohydramnios at time of the study, 3 of them refused to enrolled in our study, the obvious cause of their refusal is that difficulty to communicate with researcher at time of delivery, other 5 were lost during study time 2 of them delivered in other governorate (not in Baghdad) so the researcher could not get enough information about the exact mode of their delivery, only 35 cases have been included in this study.

#### Study tools

A special form for the questionnaire prepared by the researcher which includes several sets of questions was used. The first set includes socio-demographic information like age and BMI and another set of questions about reproductive history (parity and gestational age).

The interview took about 20 to 30 minutes, sociodemographic data including age, parity and reproductive history. Information about the present

pregnancy was also obtained including LMP (last menstrual period), EDD (expected date of delivery) early dating ultrasound scan to confirm gestational age, other fellow up scans to exclude fetal anomalies and for the study group, last scan that confirm isolated oligohydramnios by the traditional criteria for diagnosis (amniotic fluid index of 5 cm, single deepest pocket of 2 cm).

Then asses the Bishop score to evaluate patient fitness for induction of labor, after taking decision about mode of delivery fellow up patient till complete delivery and fellow up the neonate for the first 24 hour after delivery.

#### Study duration

The study plan, consent, collection and interpretation of data were done from December 2020 to April 2021.

Criteria of study population and exclusion criteria: Pregnant women between the ages of 18 and 35 with vertex presentation, bishop score of less than 4 and all parity were included. The

participants' BMI was between (18 and 25), underweight, overweight and obese pregnant women were excluded from the study, and they had no concurrent systemic disorders (pre-gestational diabetes, chronic hypertension, pregnancy-induced diseases or chronic kidney disease).

All pregnant women with age >35 years old were excluded to avoid risk of any congenital anomalies that increased with the increase of maternal age. Only vertex presentation was included (all other presentations were excluded), other exclusion criteria included Gestational age less than 34 weeks and >40 week, and Premature rupture of the membranes, fetal congenital abnormalities, placental abruption, placenta previa, multi fetal gestation and previous cesarean section.

The study sample was divided into 2 groups the first group was study group and it included all women who had an isolated oligohydramnios (AFI<5 cm) while the second group (control group) included all women with normal AFI (5-

14cm) after matching for a variety of contextual variables such as age, gestation time, and so on.

### **Ethical approval**

All members were provided a written informed consent as well as an abstract describing the study's procedure and potential benefits. Women were notified about the importance and objective of the study. The confidentiality of any information received was guaranteed.

### **Statistical analysis**

Data were collected, tabulated and analyzed by using SPSS (Version 23.0 statistical software). Mean  $\pm$  standard deviation, percentage, Chi-squared, P-value and 95% confidence interval were calculated

### **Results**

Total number of pregnant women enrolled into this study is 70. Study group includes 35 pregnant women with isolated oligohydramnios and the control group includes 35 pregnant women with normal AFI after matching of other inclusion criteria (maternal age, parity

and gestational age) for both groups, then the researcher compare both groups in term of mode of delivery and neonatal outcome. ( $P \leq 0.05$ ) is considered statistically significant.

Table (1) shows the distribution of study samples according to age, as largest percent of both groups was at age 20-25 years old (37.14%, 40%) for study and control group respectively, while lowest percentage for study group was at < 20 years (17.14%), while the lowest percentage for control group was at age 30-35 years old (20%), the means of age for study and control group were ( $26 \pm 0.35$ ,  $25 \pm 0.87$ ) respectively.

Table (2) shows the parity of the women enrolled into the research, the highest percentage of women was (para 3) in both study and control group (40%,

Table (3) shows gestation age of all women enrolled in this study, the highest percent of women of both groups were at (39-40 weeks) of gestation (48.57%, 40%) respectively, the lowest percent

was at (37 -37+6 weeks) (22.86%, 28.57%) respectively.

There are no significant differences between both groups in term of maternal age, parity and gestational age, adjusted sample, as we mentioned before because we try matching the inclusion criteria to eliminate any factor that may affect the mode of delivery.

Table (4) shows the significant difference between the study and control group in mode of delivery as the highest percent of women with IO delivered by cesarean section (68.57%) while the highest percent of women with normal AFI delivered vaginally (74.29%).

Table (5) shows that no women in the study group had spontaneous vaginal delivery while 22 case (62.86%) of control group had spontaneous vaginal delivery, (p-value = < 0.0001).

27 cases (77.14%) of study group had induction of labor (IOL) only 11 (40.74%) of them delivered vaginally after IOL, while only 9 cases (69.23%) of

control group had (IOL) and 4 cases (30.7%) (P-value = 0.54).

Table (6) compares the indications of cesarean section for both groups, there is a statistical difference in the rate of cesarean section due to abnormal doppler study before induction of labor as no women from control group had abnormal doppler that indicate cesarean section without trial of vaginal delivery.

Table -7- shows the significant difference in mean birth weigh between both study groups (P-value= 0.0380), with the statistically significant differences in Apgar score at 1 minute and 5 minutes  $\geq$  7/10 (P-value=0.0047,0.0253 respectively. With high level of significance about neonatal intensive care unit admission (NICU) admission > 24 hrs (P-value= 0.01).

No intrapartum or early neonatal death had been reported in this study.

Figure (1) shows the distribution of study sample according to different modes of delivery and causes of cesarean section.

## Discussion

Amniotic fluid plays an important role in pregnancy. [5] Oligohydramnios has been linked to a worse fetal outcome and has been identified as a probable sign of placental insufficiency. [13]

In this study we find that there is a significant association between isolated oligohydramnios and induction of labor as no case of the study group had spontaneous vaginal delivery while 22 case (62.86%) of control group had spontaneous vaginal delivery, (p-value = < 0.0001), this result match with the result of most previous studies done in this aspect. [14-19]

Twenty-seven cases (77.14%) of study group had induction of labor (IOL) only 11 (40.74%) of them delivered vaginally after IOL, while only 9 cases (69.23%) of control group had (IOL) and 4 cases (30.77%) (P-value = 0.5469), the same result was found by researcher in India at 2015. [14]

Cesarean section rate at study group was (24 cases) (68.57 %) while (9 cases)

(25.71%) of control group with (p-value = 0.0004). The most common indication of cesarean section was abnormal Doppler and fetal distress for the study group, and fetal distress during induction of labor for control group, these results can be explained by the probability of cord compression due to reduced amniotic fluid volume. These findings match those of Nankali's research. [15] This result disagreed with the result of a Systematic Reviews and Meta-Analyses that was done in India at 2016 which found that total Cesarean section rate was not significantly different between the two groups. (16) another study done by Nefise Nazli Yenigul and Osman Asicioglu[11] in Turkey found that induction of labor in pregnancies complicated with isolated oligohydramnios is not associated with higher rates of cesarean delivery, they explain their result by their trial to improve maternal outcome by reduction of cesarean delivery rate and then decrease post cesarean hemorrhage and

brake the prejudice that Woman with induced oligohydramnios means a high probability of cesarean section.

Other study done by Rizvi, et al. found that e C-section was rate was as high as 82% [17], This discrepancy in rates might be attributed to the quality of fetal monitoring used during labor, which could be an indicator for the quality of obstetric health care.

Unlike most previous studies, [15, 16, 18] this study found could not find any significant difference between both study groups in relation to the meconium-stained liquor rate, this result can be explained by the smaller sample size of both groups of the study due difficulty in gathering the data and obstacles in the management and follow up.

In this study why found that high level of significance found in Apgar score  $\geq 7/10$  at 1 and 5 minute respectively and neonatal birth weight with significant P-value, this result agreed with the most of the studies that done in this subject. [19-21]

Regarding neonatal intensive care unit admission (NICU) admission > 24hrs, a significant P-value had been observed between both study group, although the NICU observation rates have statistical significance, they are not related to higher prenatal morbidity or death, the same result also observed by Vishalakshi at 2018, [18] and by Nankali,[15] This suggests that isolated oligohydramnios isn't associated to a poor fetal outcome.

### Conclusions

Pregnancies with isolated oligohydramnios are associated with increased rate of development of fetal distress, meconium-stained liquor, rate of caesarean delivery, NICU admission and low birth weight. Rate of cesarean for fetal distress is increased because of increased rate of induction of labor in the women with oligohydramnios.

The study does not suggest any root for delivery of pregnancies with IO, It is better to give the patient chance of spontaneous labor (if there is no fetal distress) with close monitoring for the

fetal heart rate during labor. Cesarean section is indicated for IO with fetal distress at any stage of labor to decrease perinatal morbidity and mortality.

Further studies may be required to evaluate the long-term consequences of isolated oligohydramnios.

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### Author's contributions

Both of authors shared equally in this manuscript and approved the final proof for publication

### Conflict of interest

The authors declare that they have no competing interests

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**Table -1- Distribution of patients according to Age**

Age (year)	Study group (No. =35)	Control (No. =35)	P value	95% CI
	No. (%)	No. (%)		
< 20	6 (17.14)	8 (22.86)	0.5526	-13.1990 % to 24.2367%
20-25	13 (37.14)	14 (40)	0.8072	-19.0877 % to 24.4285%
26-30	7 (20)	6 (17.14)	0.7600	-15.5957% to 21.1425%
30-35	9 (25.71)	7 (20)	0.5722	-13.9356% to 24.8576%
<b>Mean age ± SD</b>	26 ± 0.35	25 ± 0.87	-1.000	-1.3163 to -0.6837

**Table -2- Distribution of patients according to parity**

Parity	Study group (No. =35)	Control (No. =35)	P value	95% CI
	No. (%)	No. (%)		
Para 0	8 (22.86)	9 (25.71)	0.7825	-17.0137% to 22.4446%
Para 1	3 (8.57)	2 (5.71)	0.6259	-11.0545% to 17.5002%
Para 2	10 (28.57)	11 (31.43)	0.7955	-18.0576% to 23.4481%
Para 3	14 (40)	13 (37.14)	0.8072	-19.0877% to 24.4285%

**Table -3- Distribution of patients according to Gestational Period (weeks)**

Gestational age (weeks)	Study group (No. =35)	Control (No. =35)	P value	95% CI
	No. (%)	No. (%)		
37 -37 <sup>+6</sup>	8 (22.86)	10 (28.57)	0.5874	-14.5653% to 25.4121%
38-38 <sup>+6</sup>	10 (28.57)	11 (31.43)	0.7955	-18.0576% to 23.4481%
39- 40	17 (48.57)	14 (40)	0.4736	-14.0685% to 30.0250%

**Table -4- Mode of delivery**

Item	Study group (No. =35)	Control (No. =35)	P value	95% CI
	No. (%)	No. (%)		
Vaginal delivery	11 (31.43)	26 (74.29)	0.0004	19.5915% to 60.1588%
Cesarean section	24 (68.57)	9 (25.71)	0.0004	19.5915% to 60.1588%

**Table -5- percentage of spontaneous and induced labor**

Item	Study group (n=35)		Control (n=35)		P-value	95% CI
<b>Spontaneous labor</b>	0		22 (62.86%)		< 0.0001	43.5958% to 76.8283%
<b>Induction of labor</b>	27 (77.14%)		13 (37.14%)		0.0008	16.8899% to 57.6582%
	Cs after induction	16 (59.26%)	Cs after induction	9 (69.23%)	0.5469	-21.4117% to 35.8672%
	Vaginal delivery after induction	11 (40.74%)	Vaginal delivery after induction	4 (30.77%)	0.5469	-21.4117% to 35.8672%
<b>Cs abnormal Doppler (no IOL)</b>	8		0		0.0500	-0.2976% to 53.2904%

**Table -6- indications for CS**

Cesarean section	Study group	Control	p-value	95% CI
	(No.=24) (68.57 %)	(No.=9) (25.71%)	0.0004	19.5915% to 60.1588%
<b>CS for abnormal Doppler (without induction)</b>	8 (33.33 %)	0	0.0500	-0.2976% to 53.2904%
<b>CS. For fetal distress during induction</b>	7 (29.17 %)	5 (55.56%)	0.1669	-8.7492% to 55.6598%
<b>CS for meconium-stained liquor</b>	5 (20.83 %)	1 (11.11%)	0.5255	-24.6791% to 31.3719%
<b>CS for failed induction</b>	4 (16.67 %)	3 (33.33%)	0.3046	-11.9878% to 49.4649%

**Table -7- Perinatal outcomes**

Item	Study group (No. =35)		Control (No. =35)		P value	95% CI
	No.	(%) or Mean ± SD	No.	(%) or Mean ± SD		
<b>Mean birth weight (kg) ± SD</b>	3.1	(± 0.76)	3.5	(± 0.82)	0.0380	0.0229 to 0.7771
<b>Apgar score at 1min ≥7/10</b>	22	(62.86 %)	32	(91.43%)	0.0047	8.9234% to 46.0176%
<b>Apgar score at 5 min ≥7/10</b>	28	(80%)	34	(97.14%)	0.0253	1.7935% to 33.2049%
<b>NICU Admission &gt; 24hrs</b>	6	(17.14 %)	0		0.0110	3.7414% to 32.6790%
<b>Intrapartum or early neonatal death</b>	0		0		0	0

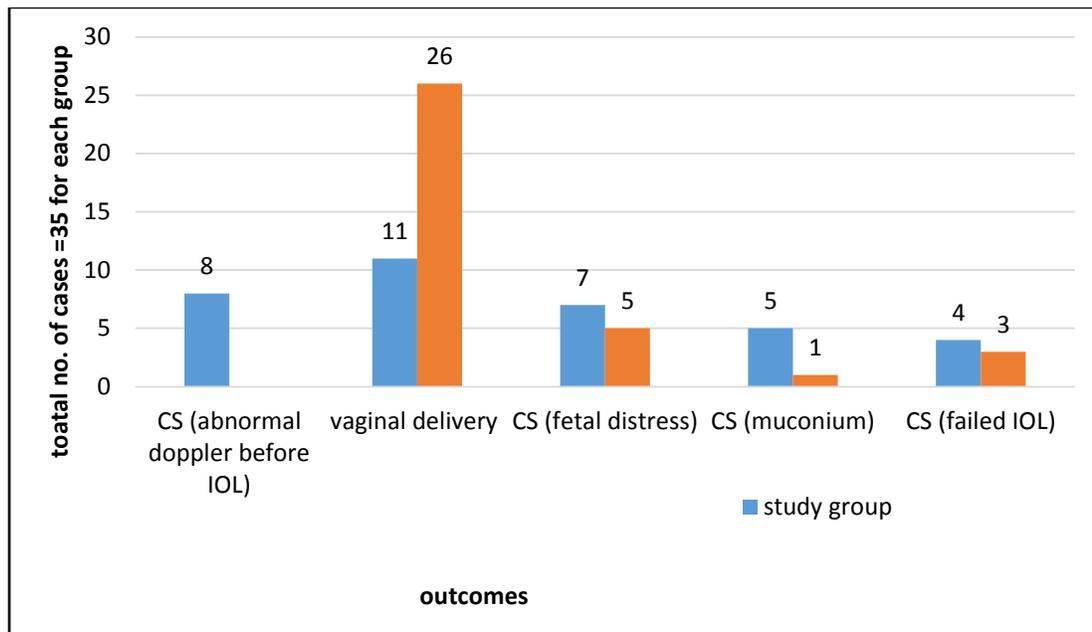


Figure -1- The distribution of data according to the outcome.

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