

Oligohydramnios and Pregnancy Outcome: Ten-Year Review

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Submitted 3 Dec 2014; Accepted 8 Jan 2015; Published 4 Feb 2015

Oligohydramnios is frequently used to identify at risk fetuses. The purpose of this study was to assess adverse perinatal outcomes in oligohydramnios. Subjects comprised pregnant women diagnosed either with (590) or without (597) oligohydramnios who delivered after hospital admittance from 2000 to 2010. Data, including the resuscitation of newborn, Apgar score at 5 min, NICU admission, death in 24 hours after birth, still birth, intrauterine growth restriction, fetal distress, meconium passage, and neonatal birth weight were abstracted from records. Chi – square, Fisher’s exact test, and t tests were used for analysis. An amniotic fluid index of 5 cm or less had a higher rate of meconium passage. Antepartum oligohydramnios is associated with an increased risk of perinatal morbidity and mortality.

Keywords: Oligohydramnios, intrauterine growth restriction, still birth

Under normal conditions, amniotic fluid volume increases linearly until about 36 weeks of pregnancy, which is average rate is 1000 mL and then it's volume decreases to less than 200 mL at 42 weeks. In the past decade a number of ultrasound methods have been used to measure the amount of amniotic fluid (1). The amniotic fluid index (AFI), as measured by the four– quadrant ultrasonic technique was added to antepartum testing to better identify fetuses at higher risk of poor perinatal outcome (2). The amniotic fluid index of less than 5 cm is termed oligohydramnios (1). Oligohydramnios involves 3- 5% of pregnancies (3).

Generally, oligohydramnios is less prevalent in early pregnancy and at this time it usually is

associated with poor prognosis (1). In uncomplicated pregnancies at 40.0 to 41.6 weeks, oligohydramnios is independently associated with a higher risk of low birth weight per centile (4). Also in multiple studies oligohydramnios has been correlated with increased risk of abnormal fetal heart rate (5-8), pulmonary hypoplasia (9, 10), increased risk of cesarean delivery (5), intrauterine growth restriction (IUGR) (7, 11), postdate pregnancy, meconium passage, lower Apgar scores (7), intensive care unit (NICU) and neonatal death (8). Thus, in high risk pregnancies, oligohydramnios is frequently used to identify fetuses at risk of an adverse outcome.

The purpose of this study was to evaluate the effect of oligohydramnios on perinatal outcome.

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Materials & methods

This retrospective study was performed on pregnant women who were admitted in Yahyanejad and Ayatollah Rohani Hospitals at Babol Medical University, Babol, Iran, between 2000 and 2010. In this study, we reviewed records of women either with or without oligohydramnios who were admitted and delivered. Exclusion

Apgar score ≥ 8 (normal) (14). Fetal distress (FD) was diagnosed by the attending obstetrician on the basis of fetal heart abnormality not corrected with left lateral position, hydration and nasal oxygen. Neonatal data taken out of the records included: resuscitation of newborn, Apgar score at 5 min, NICU admission, death in 24 hours after birth, still birth, IUGR, FD, meconium passage, and neonatal birth weight.

Table 1. Mean gestational age in women with and without oligohydramnios

| Gestational age | AFI (cm)* | N [†] | Mean \pm SD (weeks) | Sig. |
|-----------------|-----------|----------------|-----------------------|------|
| Preterm | ≤ 5 | 126 | 33.63 \pm 3.27 | 0.62 |
| | >5 | 147 | 33.82 \pm 2.92 | |
| Term | ≤ 5 | 210 | 38.13 \pm 0.76 | 0.76 |
| | >5 | 234 | 38.11 \pm 0.75 | |
| Post term | ≤ 5 | 254 | 40.52 \pm 0.62 | 0.09 |
| | >5 | 216 | 40.42 \pm 0.06 | |

criteria included women with multiple pregnancies, fetal anomaly and lack of complete information in the records. All women with oligohydramnios who delivered were entered in the study, whereas women without oligohydramnios were obtained by systematic random sampling in every year.

In our study oligohydramnios was defined as the index of amniotic fluid ≤ 5 cm (1). Gestational age was calculated from the first day of the last menstrual period (LMP) and if women were unsure of their LMP, the gestational age was determined by ultrasound scan performed before 20 weeks of pregnancy. Women were categorized into five groups based on gestational age including: immature (< 28 weeks), preterm (28- 33 weeks \pm 6 days), late preterm (34-36 weeks \pm 6 days), term (37-39 weeks \pm 6 days), postterm (≥ 40 weeks) (12). Birth weight percentile was obtained from growth chart (13). Apgar score at 5 min was divided into three groups: Apgar score ≤ 3 , Apgar score 4-7 (needed resuscitation of newborn) and

Statistical analyzes

Data were collected, coded and entered into the SPSS statistical software version 18. Statistical analyzes were performed with the Chi-square test, Fisher's exact test, and Student T-test. Statistical significance was considered at $P < 0.05$.

Results

In this study we reviewed 36872 deliveries in Babol Yahyanejad and Ayatollah Rohani Hospitals during the years 2000 to 2010.

After considering exclusion criteria, the number of pregnancies with and without oligohydramnios were 590 and 597 respectively. The mean age of women with $AFI \leq 5$ cm and normal AFI were 24.86 \pm 5.69 and 26.51 \pm 6.16 years respectively. There was a significant difference between maternal age in the two groups ($P < 0.001$). The mean pregnancy age in oligohydramnios and AFI greater than 5 groups were 38.20 \pm 3.07 and 37.89 \pm 2.98 weeks, respecti-

Table 2. Frequency of women with and without oligohydramnios based on gestational age

| | Preterm N (%) | Term N (%) | Post term N (%) | P-value |
|------------------|-------------------------|----------------------|---------------------------|----------------|
| AFI≤ 5 cm | 126 (21.4) | 210 (35.6) | 254 (43.1) | 0.051 |
| AFI= N | 147 (24.6) | 243 (39.2) | 216 (36.2) | |

vely. There was no significant difference between pregnancy ages among the two groups (P= 0.079) (Table 1).

Using the growth charts; birth weight in both groups were in 10- 90th percentile and there was no difference in prevalence of infants with small for gestational age (SGA), appropriate for gestational age (AGA) and large for gestational age (LGA) between the two groups. Frequency of women with and without oligohydramnios based on gestational age did not differ significantly

(Table 2).

Neonatal outcomes in oligohydramnios and normal amniotic fluid based on gestational age were analyzed and there were statistical significant differences in resuscitation of newborn (P= 0.02), admission in NICU (P= 0.001), death in 24 hours after birth (P= 0.024), IUGR (P= 0.001), and meconium passage (P= 0.008) between the two groups for preterm delivery. Also the two groups differed in resuscitation of newborn (P= 0.029), NICU admission (P= 0.011), *Fisher's Exact test

Table 3. Neonatal outcome in pregnant women with and without oligohydramnios based on gestational age

| Neonatal outcome | Preterm | | | Term | | | Post term | | P-value |
|--------------------------------------|-----------------|---------------|----------------|------------------|---------------|----------------|------------------|---------------|----------------|
| | AFI≤ 5cm | AFI= N | P-value | AFI≤ 5 cm | AFI= N | P-value | AFI≤ 5 cm | AFI= N | |
| Resuscitation of newborn | 22 (17.5) | 12 (8.2) | 0.02* | 7 (3.3) | 1 (0.4) | 0.029* | 4 (1.6) | 6 (2.8) | 0.52 |
| Admitted in NICU | 29 (23.0) | 12 (8.2) | 0.001 | 10 (4.8) | 2 (0.9) | 0.011 | 5 (2.0) | 9 (4.2) | 0.162 |
| Death in 24 hours after birth | 4 (3.2) | 0 (0.0) | 0.044* | 1 (0.5) | 0 (0.0) | 0.47* | 0 (0.0) | 1 (0.5) | 0.46* |
| Still birth | 1 (0.8) | 0 (0.0) | 0.47* | - | - | - | 0 (0.0) | 1 (0.5) | 0.43* |
| IUGR | 33 (26.2) | 16 (10.9) | 0.001 | 15 (7.1) | 1 (0.4) | 0.001 | 7 (2.8) | 8 (3.7) | 0.56 |
| Fetal distress | 51 (40.0) | 47 (32.2) | 0.156 | 78 (37.1) | 28 (12.0) | 0.001 | 101 (39.8) | 57 (26.4) | 0.002 |
| Meconium passage | 57 (45.2) | 43 (29.7) | 0.008 | 48 (22.9) | 31 (13.2) | 0.008 | 83 (32.1) | 57 (26.4) | 0.137 |

Table 4. Neonatal Apgar score at 5 min in pregnant with and without oligohydramnios based on gestational age

| Apgar score at 5 min | Preterm | | | Term | | | Post date | | |
|----------------------|--------------|---------------|---------|---------------|---------------|---------|---------------|---------------|---------|
| | AFI≤ 5 cm | AFI= N | P-value | AFI≤ 5 cm | AFI= N | P-value | AFI≤ 5 cm | AFI= N | P-value |
| <3 | 4 (3.2) | 3 (0.2) | | – | – | | 0 (0.0) | 1 (0.5) | |
| 4-7 | 28 (22.2) | 17 (11.6) | 0.045 | 12 (5.7) | 4 (1.7) | 0.024 | 5 (2.0) | 8 (3.7) | 0.28 |
| ≥ 8 | 94 (74.6) | 127 (86.4) | | 198 (94.3) | 230 (98.3) | | 249 (98.0) | 207 (95.8) | |

IUGR (P= 0.001), fetal distress (P= 0.001) and meconium passage (P= 0.008) in term delivery, but no statistical significant difference existed between the groups for gestational age ≥ 40 weeks except for fetal distress (P= 0.002). Still birth was not associated with oligohydramnios in preterm, term, and postdate delivery (Table 3).

Comparison of neonatal Apgar score at 5 min, between pregnant women with and without oligohydramnios based on gestational age showed that there was a statistical significant difference in low Apgar preterm and term neonates between the two groups but not in postdate neonate (Table 4).

Discussion

In order to improve antepartum risk assessment, AFI was measured in addition to non-stress testing. There is a higher risk of perinatal morbidity in women presenting oligohydramnios which is a delivery indication (15). In oligohydramnios due to pressure on the umbilical cord, fetal distress increases and probably the newborn will be delivered with a low Apgar score. In the present study, a statistical significant difference of FD in AFI \leq 5 cm and normal AFI in term and postdate pregnancies was observed. Similar to our study, Alchalabi et al. reported that FD was increased among women with reduced fluid (AFI \leq 5 cm) compared to those with liquor

(AF $>$ 5 cm) in 37-42 weeks gestational age (5). Also, Locatelli et al. showed that women with AFI \leq 5 cm had higher rate of cesarean section because of non-reassuring fetal heart rate tracing (4). In another study for 27 to 43 weeks gestational age, there was a significantly higher rate of abnormal FHR tracings in women with AFI less than or equal to 5 cm (7).

In the present study, meconium passage was statistically higher in both groups at preterm and term delivery While Golan et al. reported %29 meconium passage in pregnancy with oligohydramnios and %10.7 death (16). Alchalabi et al. in a prospective study have reported the meconium passage in %7 pregnancies with oligohydramnios which was similar to our study (5).

In our study, low Apgar score at 5 minute, resuscitation of newborn and admission in NICU in pregnancy with oligohydramnios was higher in preterm and term pregnancies. Whereas, in other studies there was no difference between groups presenting a 5 minute Apgar less than 7 (4, 5, 7). But similar to us, some authors showed a significantly higher percentage of NICU admission in infants born in normal AFI group in comparison to those with oligohydramnios (5, 7, 8).

Women in the oligohydramnios group also

also had a significantly higher rate of neonatal mortality in 24 hours after birth but no still birth. Casey et al. showed that oligohydramnios is associated with neonatal death and still birth (8). We have found that oligohydramnios is not associated with lower birth weight (< 10th percentile). Whereas, some authors reported a relationship between oligohydramnios and neonatal birth weight (4, 8).

In conclusion, according to our study, because of high morbidity in oligohydramnios pregnancies, appropriate prenatal care and fetal monitoring, timed pregnancy termination and suitable cooperation between obstetrician and pediatrician should be performed.

Acknowledgments

We would like to thank Babol University of Medical Sciences for their support.

Conflict of interests

The authors declared no conflict of interests.

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